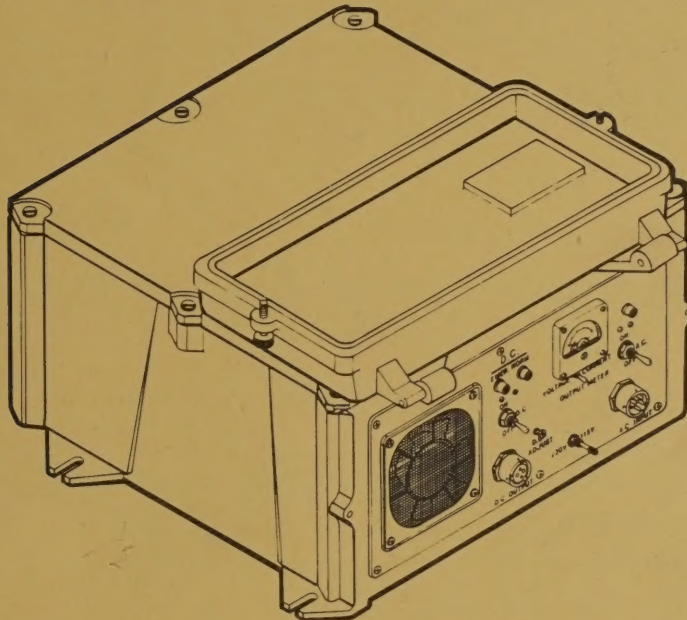


TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL**



POWER SUPPLY

PP-6224B/U

(NSN 6130-01-223-0267)

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**EQUIPMENT
DESCRIPTION
PAGE 1-2**

**OPERATION
INSTRUCTIONS
PAGE 2-1**

**OPERATOR
PMCS
PAGE 2-4**

**ORGANIZATIONAL
MAINTENANCE
INSTRUCTIONS
PAGE 3-1**

**GENERAL
SUPPORT
MAINTENANCE
INSTRUCTIONS
PAGE 5-1**

**SUBJECT INDEX
PAGE INDEX 1**

HEADQUARTERS, DEPARTMENT OF THE ARMY

1 SEPTEMBER 1988



5

SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

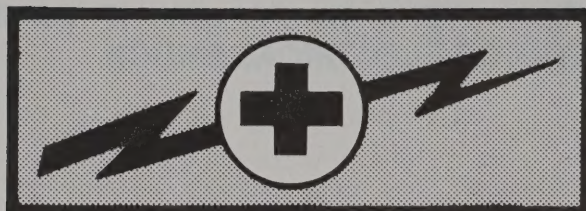
4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESPIRATION

WARNING



HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, they must be warned about dangerous areas.

The power supply must be shut off before beginning to work on it. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING:

Do not be misled by the term "low-voltage." Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

Technical Manual

No. 11-6130-458-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 September 1988

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE MANUAL
POWER SUPPLY PP-6224B/U
(NSN 6130-01-223-0267)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ME-PS, Fort Monmouth, NJ 07703-5000.

In either case, a reply will be furnished direct to you.

		PAGE
	How To Use This Manual	iii
CHAPTER 1	INTRODUCTION	1-1
Section I	General Information	1-1
II	Equipment Description	1-2
III	Principles of Operation	1-4
CHAPTER 2	OPERATING INSTRUCTIONS	2-1
Section I	Description and Use of Operator's Controls, Indicators and Connectors	2-1
II	Operator Preventive Maintenance Checks and Services (PMCS)	2-4
III	Operation Under Usual Conditions	2-7
CHAPTER 3	ORGANIZATIONAL MAINTENANCE	3-1
Section I	Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment	3-1
II	Service Upon Receipt	3-1
III	Troubleshooting	3-2
IV	Maintenance Procedures	3-4
V	Preparation for Storage or Shipment	3-6
CHAPTER 4	DIRECT SUPPORT MAINTENANCE	4-1

CONTENTS (Cont'd)		PAGE
CHAPTER 5	GENERAL SUPPORT MAINTENANCE	5-1
Section I	Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment	5-1
II	Service Upon Receipt	5-1
III	Theory of Operation	5-1
IV	Troubleshooting	5-5
V	Maintenance Procedures	5-18
VI	Preparation for Storage or Shipment	5-64
APPENDIX A	REFERENCES	A-1
APPENDIX B	MAINTENANCE ALLOCATION CHART (MAC)	B-1
APPENDIX C	COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST	C-1
APPENDIX D	NOT APPLICABLE	
APPENDIX E	EXPENDABLE SUPPLIES AND MATERIALS LIST	E-1
APPENDIX F	ILLUSTRATED LIST OF MANUFACTURED ITEMS	F-1
	SUBJECT INDEX	INDEX-1

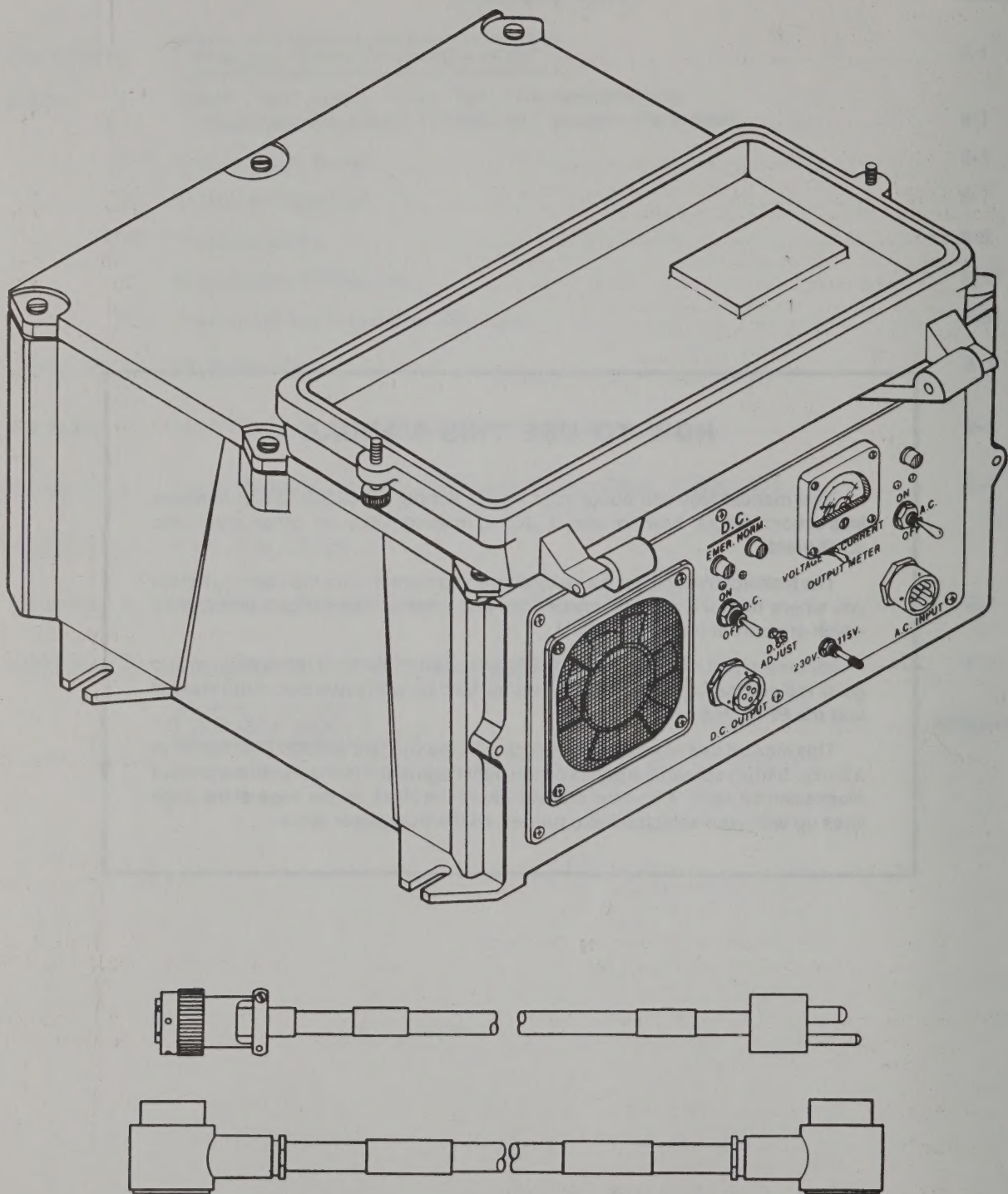
HOW TO USE THIS MANUAL

This manual tells you about your Power Supply PP-6224B/U and contains instructions about how to use it during maintenance on other electronic equipment.

The technical manual for the electronic equipment you are maintaining will tell you where to make certain connections and when to use various accessories which are part of the PP-6224B/U.

When you first receive your PP-6224B/U, start at the front of the manual and go all the way through to the back. Become familiar with every part of the manual and the PP-6224B/U.

This manual has an edge index which will help you find specific information in a hurry. Simply spread the pages on the right edge of the manual until the printed blocks can be seen. Open the manual where the block on the edge of the page lines up with your selected topic printed on the front cover block.



CEONW001

Figure 1-1. Power Supply PP-6224B/U

CHAPTER 1

INTRODUCTION

	PARA	PAGE
Consolidated Index of Army Publications and Blank Forms	1-2	1-1
Destruction of Army Materiel to Prevent Enemy Use	1-4	1-1
Equipment Characteristics, Capabilities, and Features	1-10	1-2
Equipment Data	1-11	1-3
General Functional Description	1-13	1-4
List of Abbreviations	1-9	1-2
Maintenance Forms, Records, and Reports	1-3	1-1
Nomenclature Cross-Reference List	1-6	1-2
Preparation for Storage or Shipment	1-5	1-1
Reporting Equipment Improvement Recommendations (EIR)	1-7	1-2
Safety, Care and Handling	1-12	1-4
Scope	1-1	1-1
Warranty Information	1-8	1-2

SECTION I. GENERAL INFORMATION

1-1 SCOPE

This manual contains operator's, organizational, direct support and general support maintenance instructions for Power Supply PP-6224B/U which includes procedures for removal, replacement, disassembly, cleaning, inspection, repair, test, and adjustment as authorized by the Maintenance Allocation Chart (MAC).

1-2 CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3 MAINTENANCE FORMS, RECORDS, AND REPORTS

- a. **Reports of Maintenance and Unsatisfactory Equipment.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in the Maintenance Management Update.
- b. **Report of Packaging and Handling Deficiencies.** Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73B/AFR 400-54/MCO 4430.3H.
- c. **Discrepancy in Shipment Report (DISREP) (SF 361).** Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P461.19D/DLAR 4500.15.

1-4 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Destruction of Army materiel to prevent enemy use is described in TM 750-244-2.

1-5 PREPARATION FOR STORAGE OR SHIPMENT

Preparation instructions for storage and shipment are found in Chapter 2, section V.

1-6 NOMENCLATURE CROSSREFERENCE LIST

Common names will be used when Power Supply PP-6224B/U is mentioned in this manual.

NOTE

Official nomenclature must be used when filling out report forms or looking up technical manuals.

COMMON NAME

Power Supply
PP-6224B/U

OFFICIAL NOMENCLATURE

Power Supply PP-6224B/U
Power Supply PP-6224B/U

1-7 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Power Supply needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.

1-8 WARRANTY INFORMATION

The Power Supply is warranted for a period of two years after acceptance by the government or six months after deployment to a field unit, whichever comes first, to remain free from all defects in materials and workmanship which would cause the line item to fail. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

1-9 LIST OF ABBREVIATIONS

ac	alternating current
amps	amperes
dc	direct current
rms	root mean square
vac	volts alternating current
vdc	volts direct current

SECTION II. EQUIPMENT DESCRIPTION

1-10 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

a. Characteristics

- Portable.
- Simplified Operation.
- Provides power for up to two loads.

b. Capabilities and Features

- Input power can be 115 or 230 vac at 50, 60 or 400Hz, or a 24 v storage battery.
- Output is 28 vdc nominal.
- Output is sensed at the remote load through signal wires.
- Ac input power protected by circuit breaker.
- Dc output power protected by circuit breaker and internal circuits.
- Provides automatic transfer to a storage battery when ac is not present.
- Unit design protects from discharge of the battery should ac power fail.

1-11 EQUIPMENT DATA**WEIGHT AND DIMENSIONS****WEIGHT**

Net:	36 lbs.
Shipping:	44 lbs.

DIMENSIONS

Height:	6.75 in.
Width:	14.25 in.
Depth:	14.5 in.

ENVIRONMENTAL CONDITIONS

Operating Temperature Range	-40° C (-40° F) to 66° C (150° F)
Relative Humidity	98% humidity for ten days
Operating Altitude	up to 15,000 feet above sea level
Storage Altitude	up to 40,000 feet above sea level

ELECTRICAL SPECIFICATIONS

Input Power, AC	115 vac ($\pm 10\%$) at 50, 60 or 400Hz ($\pm 5\%$) or 230 vac ($\pm 10\%$) at 50, 60 or 400Hz ($\pm 5\%$)
-----------------	--

Output Power (with ac input)

Local	24 to 32 vdc at 1% regulation
Remote	24 to 29 vdc at 1% regulation

Output Current, DC	25 amps maximum
--------------------	-----------------

Output Voltage Ripple (rms)	Maximum ripple 0.5%
-----------------------------	---------------------

Output Voltage Ripple (peak to peak)	Maximum ripple of $\pm 1\%$
--------------------------------------	-----------------------------

Input Power, DC	24 volt storage battery
-----------------	-------------------------

Output Power (with dc input)	Power is equal to capacity of storage battery used as input power for dc operation.
------------------------------	---

Stability	Output voltage drift at a constant load and ambient temperature does not exceed 0.5% over a period of 24 hours.
-----------	---

1-12 SAFETY, CARE AND HANDLING

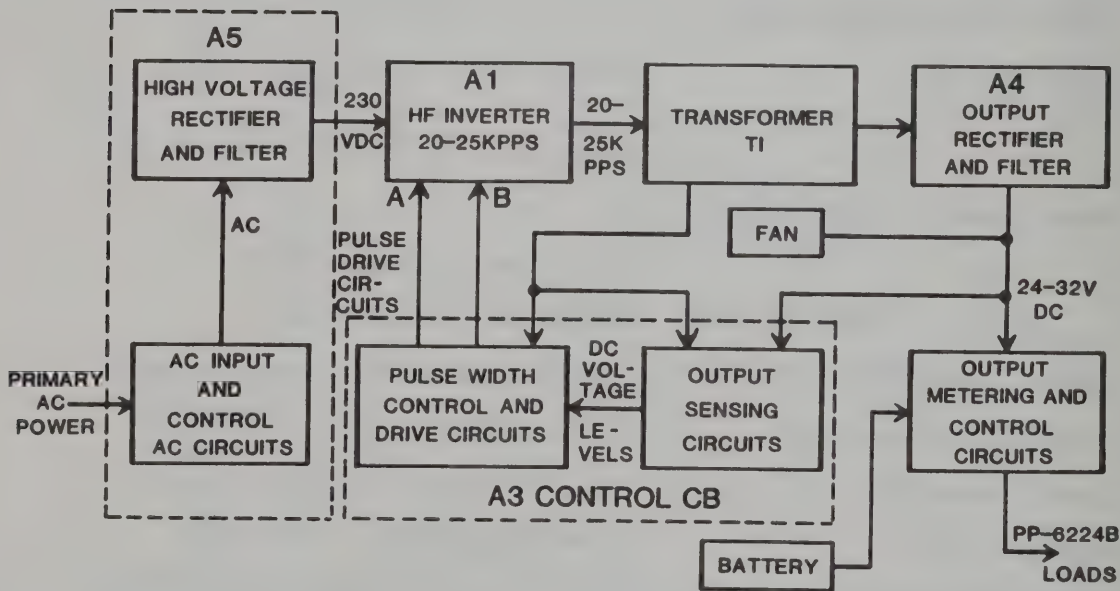
Observe all **WARNINGS**, **CAUTIONS**, and **NOTES** in this manual. This equipment can be extremely dangerous if these instructions are not followed.

SECTION III. PRINCIPLES OF OPERATION

1-13 GENERAL FUNCTIONAL DESCRIPTION (Fig. 1-2)

Primary ac power is applied through the ac input and ac control circuits. From the ac input and ac control circuits, the ac is applied to the high voltage rectifier and filter which are both contained in circuit board A5. The output of the high voltage rectifier and filter is a 230-volt dc voltage applied to the A1 circuit board high frequency (HF) inverters. Pulse drive signals A and B are applied to the HF inverters and, along with the 230-volts dc from the high voltage rectifier and filters, apply high voltage pulses of 20 to 20 K pulses per second (PPS) to transformer T1.

A step down secondary winding of transformer T1 applies approximately 30 ± 5 volts, 20 to 25 K PPS to circuit board A4 output rectifier and filter. The A4 circuit board output rectifier and filter applies the PP-6224B/U power to the loads, metering and control circuits, fan and circuit board A3 output sensing circuits. The output sensing circuits of circuit board A3 are applied to a pulse width control and drive circuits which vary the pulse width of pulse drive to the HF inverter.



CEONW002

Figure 1-2. Functional Block Diagram

CHAPTER 2

OPERATING INSTRUCTIONS

	PARA	PAGE
Ac Input Power Mode and Standby	2-7	2-8
Ac Input Power Mode	2-6	2-7
Battery Charging	2-8	2-10
Controls, Indicators and Connectors	2-2	2-1
Description and Use of Operator's Controls, Indicators and Connectors (General)	2-1	2-1
Operation In Remote Sensing	2-9	2-12
Operation In Remote Sensing and Battery Standby Mode	2-10	2-13
Operation Under Usual Conditions (General)	2-5	2-7
Operator Preventive Maintenance Checks and Services (PMCS) (General)	2-3	2-2
PMCS Procedures	2-4	2-2

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS, INDICATORS AND CONNECTORS

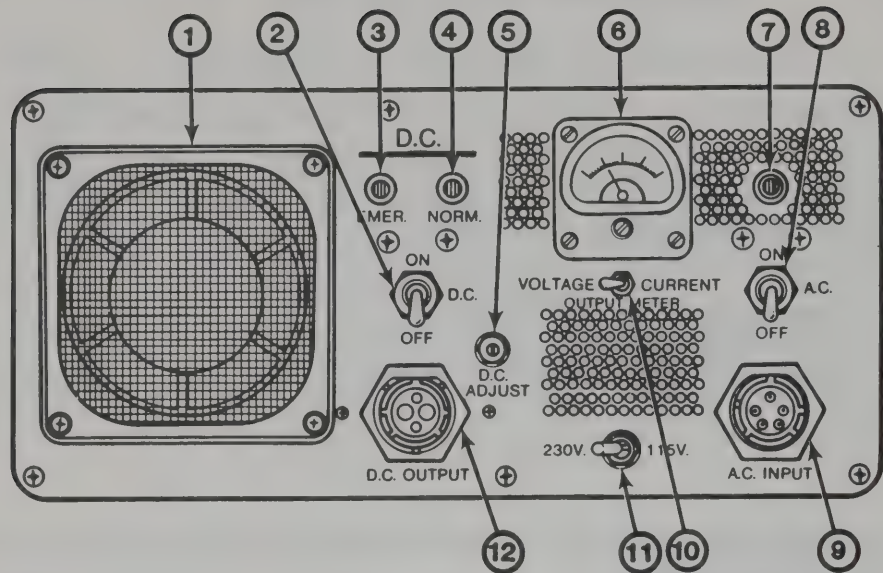
2-1 GENERAL

This section identifies and functionally describes the controls, indicator's and connectors used to operate this Power Supply.

Before trying to operate the equipment, be sure you know where all the controls, indicators and connectors are located, the function of each and the information each indicator gives.

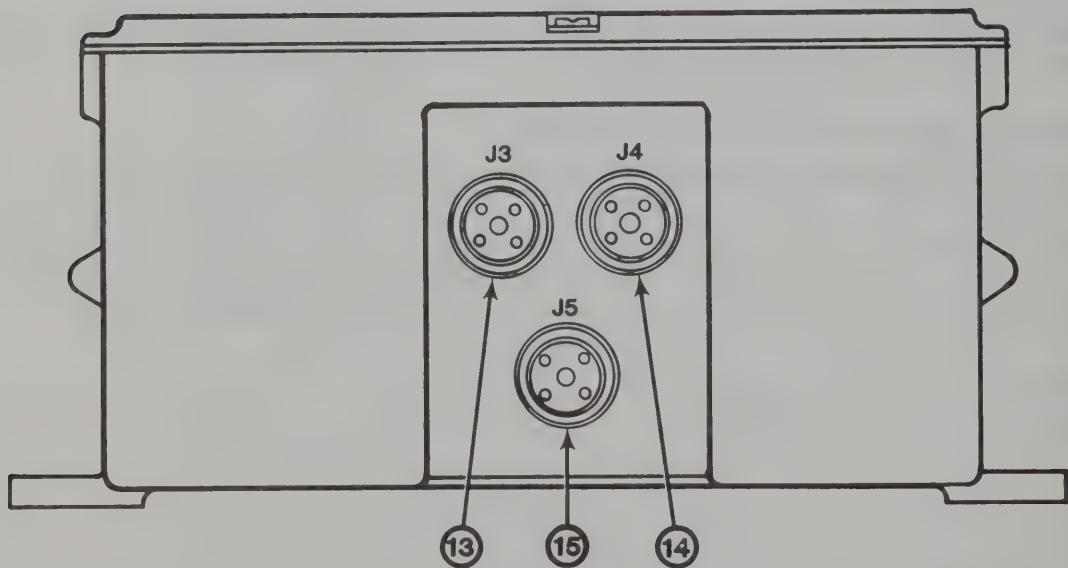
2-2 CONTROLS, INDICATORS AND CONNECTORS

Operator's controls, indicators, and connectors are shown in Fig. 2-1 and described in Table 2-1.



CEONW003

FRONT VIEW



REAR VIEW

CEONW004

Figure 2-1. Operator's Controls, Indicators and Connectors

Table 2-1. Operator's Controls, Indicators and Connectors

KEY	CONTROL, INDICATOR OR CONNECTOR	FUNCTION
①	BLOWER FAN	Provides cooling for interior of power supply.
②	DC CIRCUIT BREAKER (CB2)	Applies power to output connectors. Protects power supply circuitry.
③	EMER INDICATOR LAMP (DS3)	Indicates power supply is operating in Battery Standby Mode. Battery Standby Mode produces unregulated dc output.
④	NORM INDICATOR LAMP (DS2)	Indicates power supply is producing regulated dc output with ac input.
⑤	DC ADJUST (R2)	Adjusted for desired dc output voltage.
⑥	OUTPUT METER (M1)	Indicates dc output or current.
⑦	AC INDICATOR (DS1)	Indicates ac input voltage being applied to power supply.
⑧	AC CIRCUIT BREAKER (CB1)	Applies ac power to power supply. Protects power supply circuitry.
⑨	AC INPUT CONNECTOR (J2)	Connection for cable (CX-11979) from ac outlet to power supply.
⑩	OUTPUT METER SWITCH (S2)	Selects output voltage or current to be displayed on the output meter.
⑪	115 V-230 V SWITCH (S1)	Selects appropriate ac input voltage.
⑫	DC OUTPUT CONNECTOR (J1)	Connection for dc output power with remote sensing capability.
⑬	DC OUTPUT CONNECTOR (J3)	Connection for dc output for load operation or battery charging.
⑭	DC OUTPUT CONNECTOR (J4)	Same as item 13 above.
⑮	DC INPUT CONNECTOR (J5)	Connection for DC input in battery standby operation. Power supply will automatically switch from ac input to battery standby when ac voltage drops or is cut off.

SECTION II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3 GENERAL

Operator's Preventive Maintenance Checks and Services (PMCS) are the required daily and weekly inspection and care of equipment needed to keep it in operating condition.

2-4 PMCS PROCEDURES

a. Tools, Materials, and Equipment needed for Preventive Maintenance. No tools or equipment are needed for operator preventive maintenance. These materials will be useful:

- Lint-free cloths (Item 2, APPENDIX E).
- Dishwashing compound or detergent (Item 1, APPENDIX E).

b. Routine Checks and Services. Routine checks and services are not listed in the PMCS table. They should be done any time they are needed. If a routine check or service is found in your PMCS table, it was listed because operators reported problems with this item. Do these routine checks and services as needed:

- Clean
- Dust
- Check for cut or frayed cables
- Check for rusting
- Check controls for smooth operation
- Check for loose nuts, bolts, and connectors
- Check for completeness of equipment
- Check for completeness and current changes to publications

c. Preventive Maintenance Checks and Services. (See Table 2-2)

- (1) Do your Before (B) preventive maintenance just before you operate your equipment. Note **CAUTIONS** and **WARNINGS**.
- (2) Do your During (D) preventive maintenance while equipment is operating.
- (3) Do your After (A) preventive maintenance right after operating equipment. Note **CAUTIONS** and **WARNINGS**.
- (4) If something does not work, troubleshoot with instructions in this manual and tell your supervisor.
- (5) Always do your preventive maintenance in the same order, so it becomes a habit. After practicing, you will spot problems immediately.
- (6) If something looks wrong and you cannot fix it, write it on DA Form 2404. If something is seriously wrong, report it to organizational maintenance **RIGHT NOW**.

d. Explanation of Columns. This is an explanation of columns of Table 2-2.

- (1) *Item no.* This contains a number for procedures performed. When reporting malfunctions or failures on DA Form 2404, Equipment Inspection and Maintenance Worksheet, place number in the TM Item No. column.
- (2) *Interval.* These tell when to do a procedure. Columns that apply will contain an asterisk (*). Some procedures have asterisks in more than one column.

NOTE

All PMCS are done scheduled and under these conditions:

- *Before equipment is used on a mission*
- *When equipment is installed*
- *When equipment is reinstalled after being removed for any reason*

(3) *Item Inspected/Procedure.* This contains the name of items inspected and how to do required checks and services. Carefully follow instructions and perform them in this order.

(4) *Equipment is not ready/available if:* This column tells you:

- Why equipment cannot be used
- Why there is a problem with item inspected
- Identifies the problem with the procedure

NOTE

If equipment is kept in continuous operation, check and service items that can be checked and serviced without disturbing operation. Make complete checks and services when equipment is shut down.

These checks are made in the order listed, within designated intervals.

Table 2-2. Preventive Maintenance Checks and Services Checklist

B-Before Operation

D-During Operation

A-After Operation

Item No.	Interval			Item Inspected/Procedure	Equipment is Not Ready/Available if:
	B	D	A		
1	*			Front Panel Controls	
	*			a. Check for complete and readable front panel markings.	
				b. Check meter for cracked or broken cover; indicator needle bent or broken.	
		*		c. Check meter movement for correct operation.	Meter is not operating.
		*		d. Check that indicator lamps are lit when appropriate circuit breakers are set to ON.	
		*		e. Check air is being drawn into chassis when ac circuit breaker is set to ON.	Air is not being drawn into chassis.

[illegible]

DA FORM 2404
1 APR 79

Replaces edition of 1 Jan 64, which will be used

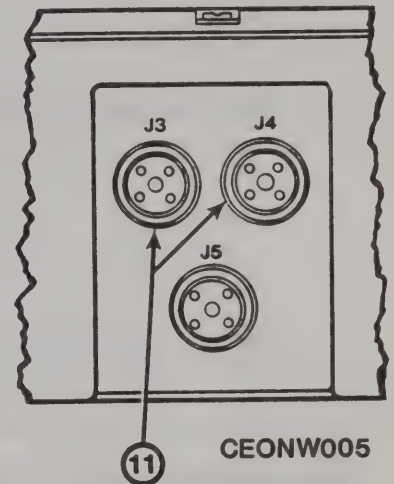
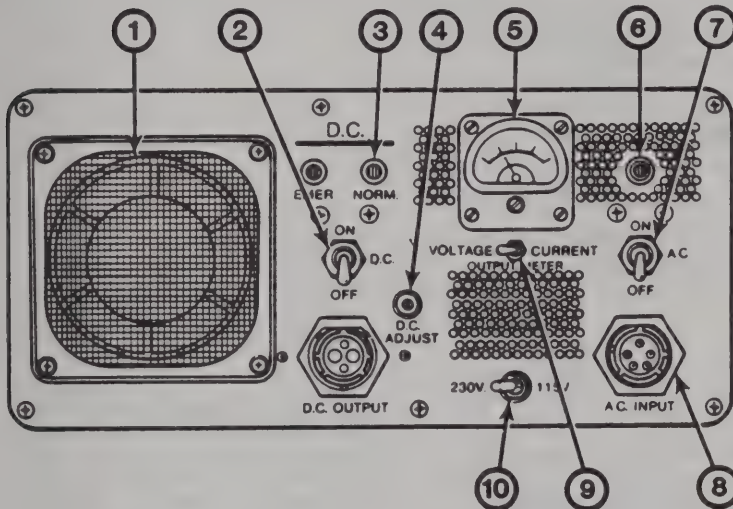
SECTION III. OPERATION UNDER USUAL CONDITIONS

2-5 GENERAL

Cable assemblies must be fabricated for battery standby, battery charging and remote sensing operations. Contact next level of maintenance for cable assembly fabrication.

Prior to operation, ensure that meter is mechanically adjusted. If not, contact next higher maintenance level for corrective action.

2-6 AC INPUT POWER



WARNING

High voltage can cause burns and electrical shock. See general warning page.

1. Set AC ON/OFF circuit breaker (7) to OFF.
2. Set DC ON/OFF circuit breaker (2) to OFF.
3. Set 230 V/115 V switch (10) to corresponding ac input. Pull switch handle out to set voltage.

CAUTION

Applying 230 vac when switch is in 115 V position will damage Power Supply.

4. Connect ac input cable (CX-11979) to AC INPUT connector (8) (J2) and ac source.
5. Connect dc output cable (CX-12342) to either J3 or J4 (11) and load.

6. Set AC ON/OFF circuit breaker (7) to ON.
 - Ac indicator lamp (6) will light.
 - Blower (1) will operate.
7. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp (3) will light.
8. Set OUTPUT METER switch (9) to VOLTAGE.
 - Output meter (5) will indicate output voltage.
9. Adjust DC ADJUST potentiometer (4) for desired output.

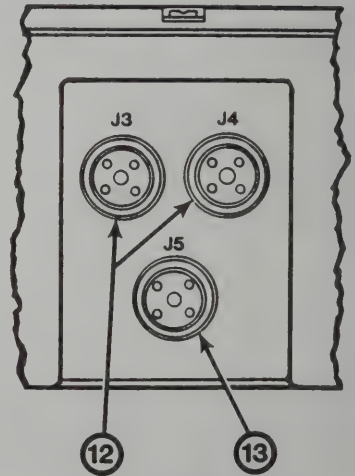
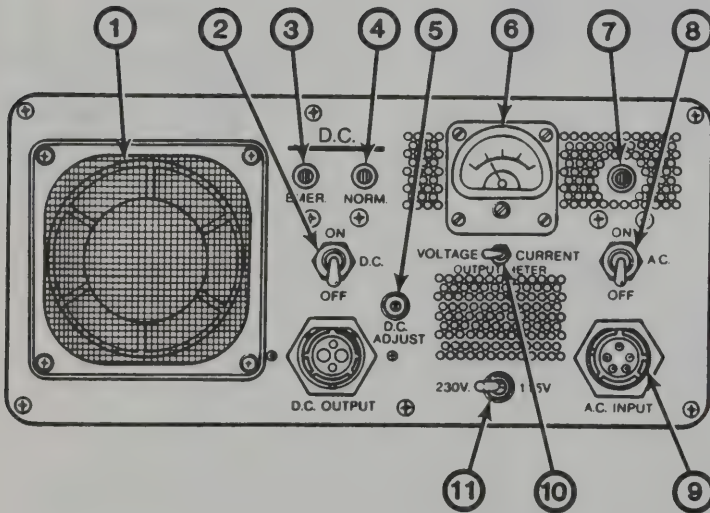
NOTE

Output current may be monitored by setting OUTPUT METER switch to CURRENT and observing meter.

2-7 AC INPUT POWER AND BATTERY STANDBY

NOTE

Battery standby cable must be fabricated.



CEONW006

WARNING

High voltage can cause burns and electrical shock. See general warning page.

1. Set AC ON/OFF circuit breaker (8) to OFF.
2. Set DC ON/OFF circuit breaker (2) to OFF.
3. Set 230 V/115 V switch (11) to corresponding ac input. Pull switch handle out to set voltage.

CAUTION

Applying 230 vac when switch is in 115 V position will damage Power Supply.

4. Connect ac input cable (CX-11979) to AC INPUT connector (9) (J2) and ac source.
5. Connect dc output cable (CX-12342) to either J3 or J4 (12) and load.
6. Connect battery standby cable (fabricated) to J5 (13) and external storage battery.

CAUTION

Insure polarity is correct when connecting cable to external storage battery. Reverse polarity will cause equipment damage.

7. Set AC ON/OFF circuit breaker (8) to ON.
 - Ac indicator lamp (7) will light.
 - Blower (1) will operate.
8. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp (4) will light.
9. Set OUTPUT METER switch (10) to VOLTAGE.
 - OUTPUT METER (6) will indicate output voltage.
10. Adjust DC ADJUST potentiometer (5) for desired voltage.

NOTE

Output current may be monitored by setting OUTPUT METER switch to CURRENT and observing meter.

11. In 115 vac operation, when ac is lost or drops below 77 vac, the Power Supply will automatically switch to battery standby.
 - DC EMER indicator lamp (3) will light.
 - DC NORM indicator lamp (4) will turn off.
 - Blower (1) will stop.
12. In 115 vac operation, when ac recovers to 103 vac or greater, the Power Supply will automatically switch to ac operation with controlled dc output.
 - DC NORM indicator lamp (4) will light.
 - DC EMER indicator lamp (3) will turn off.
 - Blower (1) will operate.

13. In 230 vac operation, when ac is lost or drops below 154 vac, the Power Supply will automatically switch to battery standby.
 - DC EMER indicator lamp (3) will not light.
 - DC NORM indicator lamp (4) will turn off.
 - Blower (1) will stop.
14. In 230 vac operation, when ac recovers to 206 vac or greater, the Power Supply will automatically switch to ac operation with controlled dc output.
 - DC NORM indicator lamp (4) will light.
 - DC EMER indicator lamp (3) will turn off.
 - Blower (1) will operate.

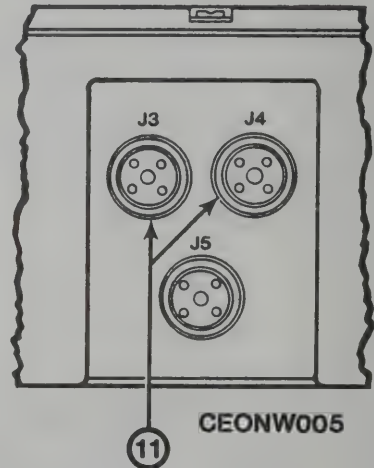
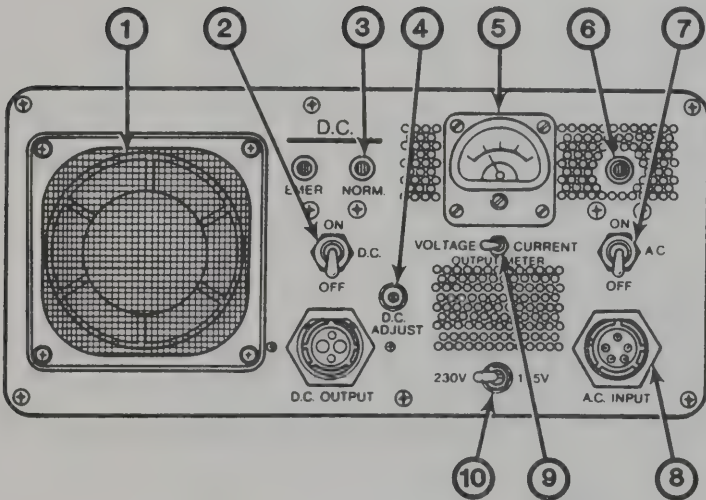
NOTE

For powering down procedure, DC ON/OFF circuit breaker to OFF, AC ON/OFF circuit breaker to OFF.

2-8 BATTERY CHARGING

NOTE

Battery charger cable must be fabricated.



WARNING

High voltage can cause burns and electrical shock. See general warning page.

1. Set AC ON/OFF circuit breaker (7) to OFF.
2. Set DC ON/OFF circuit breaker (2) to OFF.

5. Set AC ON/OFF circuit breaker (7) to ON.
 - Ac indicator lamp (6) will light.
 - Blower (1) will operate.
6. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp will light.
7. Set OUTPUT METER switch (9) to VOLTAGE.
 - Output Meter (5) will indicate output voltage.
8. Adjust DC ADJUST potentiometer (4) for desired voltage.

NOTE

- *Refer to battery specifications for proper charging voltage/current.*
- *Output current may be monitored by setting OUTPUT METER switch to CURRENT and observing meter.*

9. Set DC ON/OFF circuit breaker (2) to OFF.
10. Set AC ON/OFF circuit breaker (7) to OFF.
 - Ac indicator lamp (6) will turn off.
 - Blower (1) will stop.
11. Connect battery charger cable to either J3 or J4 (11) and battery to charge.

WARNING

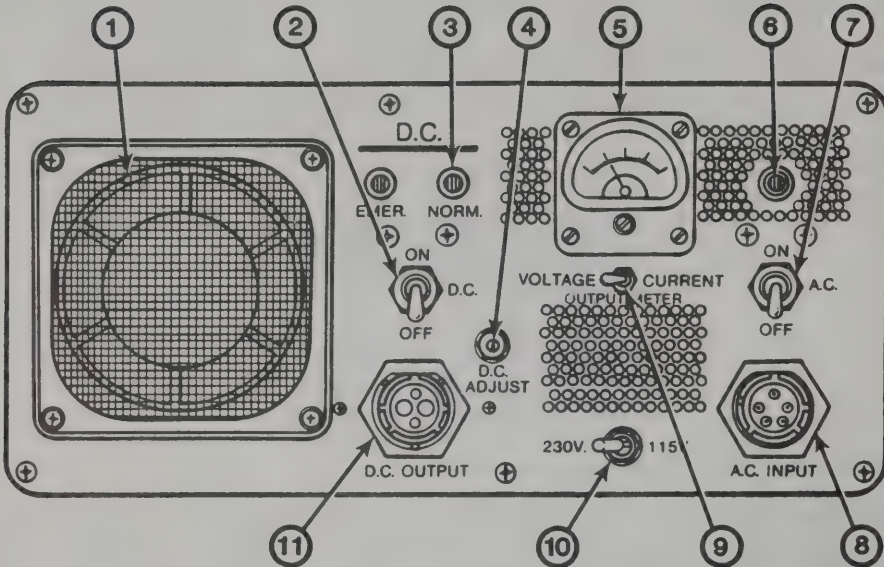
When connecting cable to battery being charged, insure polarity is correct. Reverse polarity will cause equipment damage. Improper charging connections can cause explosion, fire and bodily harm.

12. Set AC ON/OFF circuit breaker (7) to ON.
 - Ac indicator lamp (6) will light.
 - Blower (1) will operate.
13. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp (3) will light.
14. Keep battery under charge until it has reached the proper level of charge.

2-9 OPERATION IN REMOTE SENSING

NOTE

Remote sensing cable must be fabricated.



CEONW006

WARNING

High voltage can cause burns and electrical shock. See general warning page.

1. Set AC ON/OFF circuit breaker (7) to OFF.
2. Set DC ON/OFF circuit breaker (2) to OFF.
3. Set 230 V/115 V switch (10) to corresponding ac input. Pull switch handle out to set voltage.

CAUTION

Applying 230 vac when switch is in 115 V position will damage Power Supply.

4. Connect ac input cable (CX-11979) to AC INPUT connector (8) (J2) and ac source.
5. Connect remote sensing cable to front panel DC OUTPUT connector (11) (J1) and load.
6. Set AC ON/OFF circuit breaker (7) to ON.
 - Ac indicator lamp (6) will light.
 - Blower (1) will operate.

7. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp (3) will light.
8. Set OUTPUT METER switch (9) to VOLTAGE.
 - OUTPUT METER (5) will indicate output voltage.

NOTE

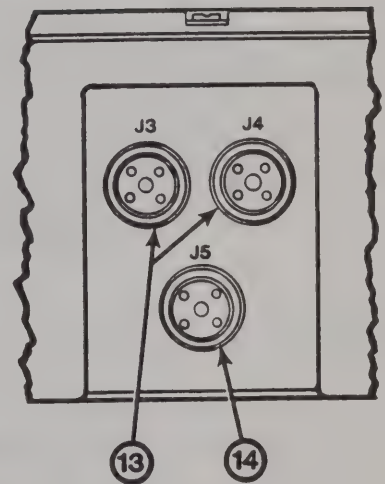
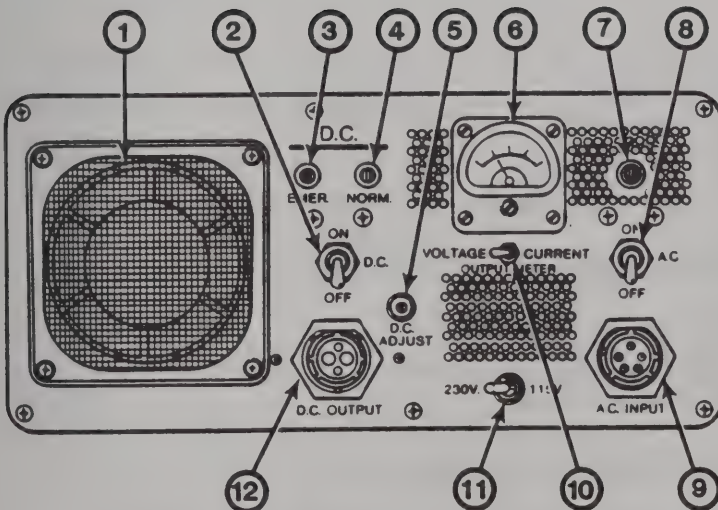
Output current may be monitored by setting OUTPUT METER switch to CURRENT and observing meter.

9. Adjust DC ADJUST potentiometer (4) for desired output.
10. During remote sensing operation, the output of the Power Supply is sensed at the load and automatically adjusted.

2-10 OPERATION IN REMOTE SENSING AND BATTERY STANDBY

NOTE

Remote sensing and battery standby cables must be fabricated.



CEONW007

WARNING

High voltage can cause burns and electrical shock. See general warning page.

1. Set AC ON/OFF circuit breaker (8) to OFF.
2. Set DC ON/OFF circuit breaker (2) to OFF.
3. Set 230 V/115 V switch (11) to corresponding ac input.

CAUTION

*Applying 230 vac when
switch is in 115 V position
will damage Power Supply.*

4. Connect ac input cable (CX-11979) to AC INPUT connector (9) (J2) and ac source.
5. Connect remote sensing cable to front panel DC OUTPUT connector (1) (J1) and load.
6. Connect battery standby cable to rear panel dc in connector J5 (14) and external storage battery.

CAUTION

*When connecting battery
standby cable to external
storage battery, insure
polarity is correct. Reverse
polarity will cause equip-
ment damage.*

7. Set AC ON/OFF circuit breaker (8) to ON.
 - Ac indicator lamp (7) will light.
 - Blower (1) will operate.
8. Set DC ON/OFF circuit breaker (2) to ON.
 - DC NORM indicator lamp (4) will light.
9. Set OUTPUT METER switch (10) to VOLTAGE.
 - OUTPUT METER (6) will indicate output voltage.

NOTE

*Output current may be mon-
itored by setting OUTPUT
METER switch to CURRENT
and observing meter.*

10. Adjust DC ADJUST potentiometer (5) for desired output.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE

	PARA	PAGE
Administrative Storage	3-11	3-6
Checking Unpacked Equipment	3-5	3-1
Common Tools and Equipment	3-1	3-1
Preservation, Packing, Marking, Shipping Requirements	3-12	3-6
Replace Front Cover	3-9	3-6
Replace Fan Filter	3-10	3-5
Repair Parts	3-3	3-1
Special Tools, TMDE, and Support Equipment	3-2	3-1
Symptom Index	3-7	3-2
Troubleshooting (General)	3-6	3-2
Troubleshooting Table	3-8	3-2
Unpacking	3-4	3-1

SECTION I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

3-1 COMMON TOOLS AND EQUIPMENT

Common tools and equipment required for organizational maintenance of Power Supply PP-6224B/U are listed in Appendix B (Maintenance Allocation Chart).

3-2 SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment are required to perform organizational maintenance tasks.

3-3 REPAIR PARTS

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 11-6130-458-24P.

SECTION II. SERVICE UPON RECEIPT

3-4 UNPACKING

Inspect the shipping carton for possible damage before unpacking the unit. Carefully unpack the equipment as follows:

- a. Open shipping carton and remove equipment.
- b. Place equipment on a suitable clean and dry surface for inspection.
- c. Keep all shipping materials for use in repacking and reshipping.

3-5 CHECKING UNPACKED EQUIPMENT

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF-364, Report of Discrepancy (ROD).
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies with the instructions of DA PAM 738-750.
- c. Check to see if the equipment has been modified.

SECTION III. TROUBLESHOOTING

3-6 GENERAL

This section contains the authorized organizational maintenance troubleshooting procedures for Power Supply PP-6224B/U. Organizational maintenance is not authorized to open up the Power Supply for troubleshooting or maintenance.

3-7 SYMPTOM INDEX

<u>POWER SUPPLY SYMPTOM</u>	<u>PAGE</u>
1. AC ON/OFF circuit breaker switch CB1 flips to OFF	3-2
2. Ac ON green indicator lamp DS1 does not light when AC ON/OFF circuit breaker switch is set to ON	3-3
3. Blower does not operate	3-3
4. No output. Both green indicator lamps are lit. OUTPUT METER indicates desired voltage but zero current.	3-3
5. DC ON/OFF circuit breaker flips to OFF, ac ON green indicator lamp DS1 is lit	3-3

3-8 TROUBLESHOOTING TABLE

The troubleshooting table (Table 3-1) lists common malfunctions which may be found during operation or maintenance of the Power Supply or its components. You should perform the tests/inspections and corrective actions in the order listed.

NOTE

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify next higher level of maintenance.

Table 3-1. Troubleshooting

<u>MALFUNCTION</u>	<u>TEST OR INSPECTION</u>	<u>CORRECTIVE ACTION</u>
1. AC ON/OFF circuit breaker switch CB1 flips to OFF.	STEP 1. Verify that the 230 V/115 V ac selector switch is set to the same voltage as the ac source. STEP 2. Check cable assembly CX-11979 (ac input cable) for short circuits.	<ul style="list-style-type: none">• Replace faulty cable.• If above steps do not solve the problem, refer the problem to higher level maintenance.

Table 3-1. Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. Ac ON green indicator lamp DS1 does not light when AC ON/OFF circuit breaker switch CB1 is set to ON.	Check that blower is operating.	<ul style="list-style-type: none"> • If blower is operating, assume the indicator lamp is defective. Do not attempt to change the lamp. Refer the problem to higher level maintenance and continue to use the Power Supply. • If blower does not operate, do not attempt any further operation. Refer the problem to higher level maintenance.
3. Blower does not operate.	Check to see if ac ON green indicator lamp DS1 and DC NORM green indicator lamp DS2 are lit.	<ul style="list-style-type: none"> • If both indicators are lit, the blower is defective. Do not operate the Power Supply. Refer the problem to higher level maintenance. • If the indicators are not lit, do not attempt operation. Refer the problem to higher level maintenance.
4. No output. Both green indicator lamps are lit. OUTPUT METER indicates desired voltage but zero current.	STEP 1. Check that any cable connecting the load to the Power Supply is properly and securely connected.	<p data-bbox="270 1174 1282 1253">STEP 2. Check for open circuits in cable assembly CX-12342 (dc output cable) or in any fabricated cable assembly used to connect the Power Supply to the load.</p> <ul style="list-style-type: none"> • Replace faulty cable. • If above steps do not solve the problem, refer the problem to higher level maintenance.
5. DC ON/OFF circuit breaker switch CB2 flips to OFF. Ac ON green indicator lamp DS1 is lit.	STEP 1. Check that any cable connecting a load to the Power Supply is properly and securely connected and polarity observed.	<p data-bbox="270 1517 1282 1596">STEP 2. Check for short circuits in cable assembly CX-12342 (dc output cable) or in any fabricated cable assembly used to connect the Power Supply to the load.</p> <ul style="list-style-type: none"> • Replace faulty cable. • If above steps do not solve the problem, refer the problem to higher level maintenance.

SECTION IV. MAINTENANCE PROCEDURES

3-9 REPLACE FRONT COVER

DESCRIPTION:

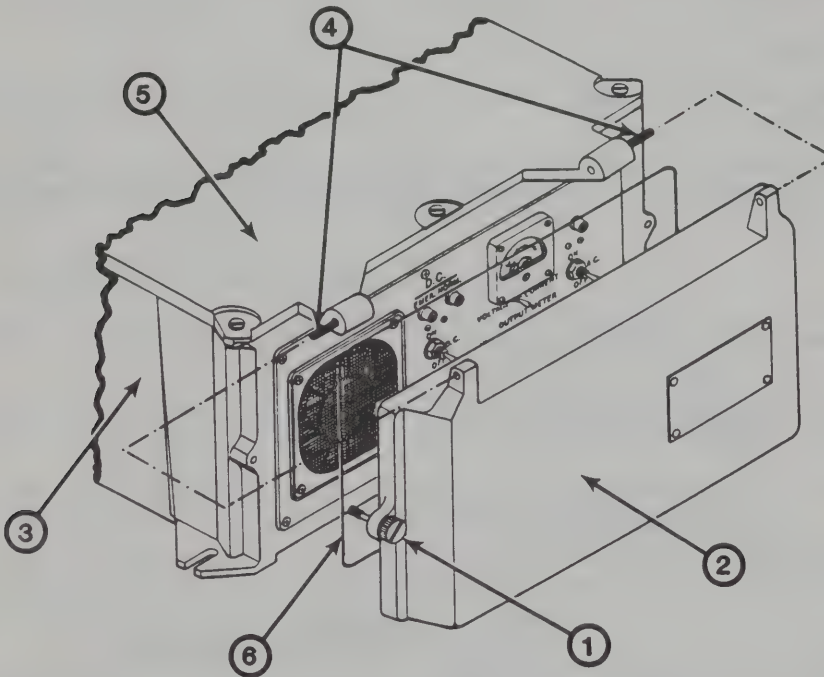
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Loosen two knurled captive screws (1) on both sides of front panel cover (2) until front panel cover is free of case (3).
2. Remove two hinge pins (4) to remove the front panel cover (2). The front panel cover (2) will come free from the top cover (5). Retain gasket (6) should it become disengaged from front panel cover.



CEONW008

INSTALL

1. Place the front panel cover (2) in position over the front panel. Be sure gasket (6) is in place on the front panel cover (2).
2. Install two hinge pins (4) engaging top cover (5).
3. Tighten two knurled captive screws (1) securing the front panel cover (2) to the case (3).
4. Connect all power cables.

END OF TASK

3-10 REPLACE FAN FILTER

DESCRIPTION:

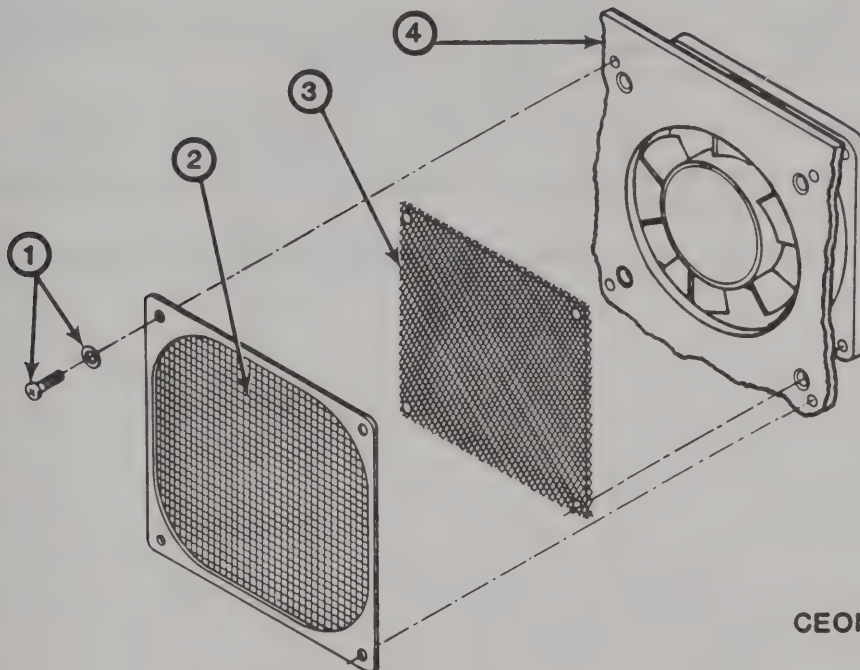
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove four screws and washers (1) securing cover (2) and filter (3) to chassis (4).
2. Remove cover (2) and filter (3).



CEONW009

INSTALL

1. Align cover (2) and filter (3) to chassis (4).
2. Install and tighten four screws and washers (1) securing cover and filter to chassis (4).
3. Connect all power cables.

END OF TASK

SECTION V. PREPARATION FOR STORAGE OR SHIPMENT

3-11 ADMINISTRATIVE STORAGE

Refer to TM 740-90-1 for procedures, forms and records, and inspection required during administrative storage of this equipment.

3-12 PRESERVATION, PACKAGING, MARKING AND SHIPPING REQUIREMENTS

There are no preservation requirements for the Power Supply PP-6224B/U nor are there any special packaging, marking, or shipping requirements for either the storage or shipment of this equipment. When preparing the equipment for storage or shipment, use standard commercial practices, identified in MIL-STD-1188A, which include:

- a. Cleanliness.** Ensure that the equipment is free to from dirt and contaminants which would contribute to its deterioration.
- b. Cushioning.** Ensure that the equipment is protected from physical and mechanical damage by wrapping, cushioning, pack compartmentization, cartonizing, or some other suitable means to mitigate shock and vibration during handling and shipment.
- c. Unit Pack Quantity.** It is recommended that each unit be individually packaged.
- d. Packing.** Pack units in exterior shipping containers that meet common carrier acceptance and provide safe delivery to destination.
- e. Marking.** The exterior shipping container should be marked by any means that provides legibility and durability.

CHAPTER 4

DIRECT SUPPORT MAINTENANCE

There is no direct support maintenance authorized for Power Supply PP-6224B/U.

CHAPTER 5

GENERAL SUPPORT MAINTENANCE

	PARA	PAGE
Adjustments		5-61
Circuit Descriptions	5-6	5-2
Common Tools and Equipment	5-1	5-1
Maintenance Procedures (General)	5-10	5-19
Performance Tests		5-47
Preparation for Storage or Shipment	5-41	6-62
Removal and Replacement Procedures	5-11	5-20
Repair Parts	5-3	5-1
Service Upon Receipt (General)	5-4	5-1
Special Tools, TMDE, and Support Equipment	5-2	5-1
Symptom Index	5-8	5-5
Theory of Operation	5-5	5-1
Troubleshooting (General)	5-7	5-5
Troubleshooting Table	5-9	5-5

SECTION I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

5-1 COMMON TOOLS AND EQUIPMENT

Common tools and equipment required for general support maintenance of Power Supply PP-6224B/U are listed in Appendix B (Maintenance Allocation Chart).

5-2 SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment are required to perform general support maintenance tasks.

5-3 REPAIR PARTS

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 11-6130-458-24P.

SECTION II. SERVICE UPON RECEIPT

5-4 GENERAL

Refer to Chapter 3, Section II for service upon receipt information.

SECTION III. THEORY OF OPERATION

5-5 GENERAL

This section provides additional theory of operation needed by general support maintenance personnel to repair the Power Supply. This information is in addition to the information provided in Chapter 1, Section III.

5-6 CIRCUIT DESCRIPTIONS (Fig. FO-1)

a. INPUT POWER

The power supply receives 115 volts or 230 volts ac power from the line via ac input receptacle J2 and ac circuit breaker CB1. This ac flows through the input EMI filter A5FL1 and the soft-start relay A5K1 to the input bridge rectifier A5BR1 and filter C1 and C2. The ac selector switch S1 connects A5BR1, C1 and C2 in either a voltage multiplying configuration for 115 vac operation or a standard bridge configuration for 230 vac operation. This assures that the same voltage of approximately 320 vdc at no load is applied to the input of the inverter A1 regardless of which input condition is utilized.

b. INPUT VOLTAGE DETECTOR

The ac input voltage is detected indirectly by monitoring the resultant dc voltage at the inverter A1 and control A3. This dc voltage is applied via voltage divider A3R2, A3R8 to section A of a comparator non-inverting input pin 7 of A3U2. This comparator has a low output when the dc voltage falls below the 5.1 volt reference level which is supplied to pin 6. This reference voltage is provided by Zener diode A3CR1. The values of A3R2 and A3R8 are selected so that the detector goes to low when ac input voltage fails completely or when the input voltage falls to a low of 77 (plus 12, minus 0) volts rms for 115 volt setting or a low of 154 (plus 24, minus 0) volts rms nominal for a 230 volt setting. The output (pin 1) of A3U2 is connected to the soft start and transfer relay circuitry.

c. SOFT-START AND TRANSFER RELAY CIRCUIT

Relay A5K1 and A5R1 provides the soft-start function by switching in the line voltage when the line detector goes high. The power transfer relay is energized when A5K1 is energized. Therefore, when the line detector goes low, the power transfer relay is de-energized connecting the emergency battery input J5 to the output connectors J3, J4 and J1. Transistor A3Q3, A3C3, A3R3 and A3R6 form a time delay circuit. The collector of A3Q3 follows the 14.2 volt auxiliary supply as the voltage comes up and is held to a high state when the output of the line detector is low. When the line detector goes high, the collector of A3Q3 ramps down with a time delay. Transistor A3Q2 clamps off the current from A3Q1 base drive resistor A3R4 holding A3Q1 off. The emitter of A3Q2 is referenced to the Zener reference voltage of A3CR2 of 9.1 volts. When the ramp on A3Q3 collector is less than +10 volts, A3Q2 turns off and A3Q1 turns on energizing A5K1 and in turn energizing the power transfer relay K1. A3CR5 is provided to clamp the induced kickback voltage of A5K1 as it de-energizes. Diode A3CR6 and resistor A3R28 develop a current which is applied to pin 6 of A3U1 thus forcing the output pin 7 of A3U1 low. When the ramp voltage drops below about 5 volts, pin 7 of A3U1 ramps up which gradually increases the width of pulses from the pulse width modulator on board the main control integrated circuit A3U1. This gradual pulse width increase to the drive of switcher inverter A1 insures that the transformer is uniformly driven and also limits output over-shoot.

d. CONTROL, PULSE WIDTH MODULATOR (PWM)

The main integrated circuit A3U1 provides the pulse width modulation control. This integrated circuit contains an oscillator ramp generator, reference voltage, amplifier, dual comparator circuitry as well as the gated output drive sections. This circuit obtains external information such as; output voltage level, current level, input line condition and transformer flux density and then provides the proper output drive which corresponds to these various external conditions.

Pins 1 and 15 of A3U1 are the collectors, and pins 2 and 14 are the emitters of the two output drive transistors. These transistors are normally off and are turned on alternately for the pulse width which is determined by the level of the voltage error amplifier output (pin 7 of A3U1) as compared to the level of the timing ramp A3C6 and A3R23.

e. ERROR VOLTAGE DETECT AND SENSING AMPLIFIER

The output voltage of the power supply is sensed by the voltage divider network which is formed across the output by the front panel pot (R2) and resistors A3R55 and A3R56. This voltage is then input to section D of A3U6 which acts as an impedance matching unity gain follower. Section A of A3U6 is also a unity gain amplifier whose output is equal to the voltage developed across A3R55. Section B of A3U6 is an error amplifier whose non-inverting input pin 5 is set to the 2.5 volt reference and whose inverting input pin 6 is tied to the output of A3U6A. Thus, when the inverting input of A3U6 section B is more positive than its non-inverting input, the output drives down increasing the current through the input section of the opto-isolator A3U5. The output of transistor side of A3U5 injects a current proportional to the input drive current into the inverting input of the main control IC A3U1. This decreases the pulse width or the drive of the output sections of A3U1. Thus, the opto-isolator provides the noiseless signal transfer from the detected output to the primary control side of the regulator. Pin 5 of A3U1 is the positive input of the internal amplifier section and is connected to pin 13 via A3R24. Pin 13 is the 1.65 volt reference which is built into the A3U1 control circuit. The negative current pulses which are sensed from the inverter are fed to pin 5 of A3U1 through A3C8 and A3R25 to balance the transformer T1.

f. REMOTE SENSING

For situations where line losses become significant and voltage regulation is critical, remote sensing input has been provided. Front panel dc output connector J1 includes the remote sense pins J1A (positive) and J1C (negative). Care should be taken to assure that the correct polarity sense lead is tied together with the correct polarity output of the Power Supply at the load.

When the sense leads are connected properly, the detected voltage actuates relay A3K3 and transfers the internal sense points of the supply to the remote sense leads. If either load is interrupted, the A3K3 relay will deactivate and the supply will return to its internal sensing points.

g. UNIT DRIVE AND SWITCHING INVERTER

The drive signals from the A3 control board provide the timing and voltage that are required by A1 switcher and transformer T1 for voltage conversion. Transistor A1Q4 is forward biased by A1R2 and provides bias for A1Q3. The current through drive transformer A1T3 reverse biases A1Q7, A1Q8 until A1T3 saturates and clamps A1Q7, A1Q8 off via A1CR16, A1CR20. The energy created by this current is stored in the core of A1T3. Transistor A3Q5 is turned on by the pulse output of A3U1 pin 14. This causes A1Q4, A1Q3 to turn off and A1T3 to discharge its energy into the base circuits of A1Q7, A1Q8. The emitter current of A1Q8 is fed through a winding of A1T3 giving a drive current that is proportional to the emitter collector current. Resistors A1R11, A1R12 force base current sharing into A1Q7 and A1Q8. Diodes A1CR18, A1CR19, A1CR17 and A1CR14, A1CR15, A1CR13 form a "Baker Clamp" circuit which provides clamping action to prevent switching transistor saturation. When the pulse to A3Q5 terminates, A1Q4 and A1Q3 turn on. Current is shunted out of A1T3 and A1Q7, A1Q8 become reverse biased via A1CR16, A1CR20. Diode A1CR2 clamps off the voltage of A1T3 when it rings out. The same action is obtained for A1Q5, A1Q6 as A1Q1, A1Q2 and A3Q4 are turned on by the pulse output of A3U1 pin 2.

The four main switching transistors A1Q5, A1Q6, A1Q7, A1Q8 form a bridge along with the switching power transformer T1 and combine to make the inverter. A1Q7, A1Q8 apply one polarity to the primary of T1 when they are driven and A1Q5, A1Q6 apply a reversed polarity when they are driven. The diodes A1CR21, A1CR22, A1CR23, A1CR24 are clamping diodes. Resistor R5 and capacitor A1C7 provide snubbing action.

h. OUTPUT RECTIFIERS AND CIRCUITS

The voltage from T1 is rectified by a full wave bridge configuration of diodes A2CR1, CR2 and A4CR1, CR2. This rectified voltage is filtered by C3 and L1. R6 is provided to bleed off the capacitor voltage. The rectified and filtered dc output is passed through the current shunt, power transfer relay and dc circuit breaker to the output connectors J3, J4 and J1 through their corresponding EMI filter networks.

i. CURRENT LIMITER

The output current of the Power Supply is limited by the dc circuit breaker CB2 as well as by internal current sensing at the inverter.

This inverter current is sensed across the .0 Ω , 10 watt resistor A1R13 and is applied to a filter consisting of A3R29, A3C9. The output of the filter is fed through a divider consisting of trimpot A3R11 and resistors A3R26, A3R12 to the non-inverting input of comparator section B (pin 5) of A3U2. If this negative going current pulse is more negative than the control circuit common, pin 3 of A3U1 is pulled low terminating the half cycle. Therefore, this current sensing function is performed on a cycle by cycle basis by the control circuit A3U1. The current limit point can be adjusted by trimpot A3R11 and should be set so that Power Supply current is limited to between 25 to 30 amps.

j. SECONDARY FUNCTIONS

- (1) **Primary Supply:** The dc high voltage input rectifier circuit A5BR1, C1, C2 provides the current to the two drive sections of the inverter by R3 and R4. These currents flow through A1T2, A1T3, A1Q1, A1Q3 and Zener diodes A3CR2, A3CR3. The voltage developed across A3CR2 (9.1 volts) and A3CR3 (5.1 volts) combine to provide the 14.2 volt internal supply for the primary control circuitry. Zener diode A3CR1 is fed by A3R1 and provides the 5.1 volt reference.
- (2) **Secondary Supply:** A center tapped secondary of T1 provides auxiliary power. Diodes A3CR17 thru A3CR20 form a bridge rectification circuit for the +10 volt auxiliary. A3CR15, A3Q7, A3R44, A3C17 form a +5 volt auxiliary while A3CR16, A3Q8, A3R45, A3C18 form a -5 volt auxiliary. A3U4 is an integrated circuit voltage regulator which produces the 2.5 volt reference.
- (3) **Flux Detector:** Transformer flux density information is provided by a secondary winding of T1. A window comparator circuit is formed by A3U2, A3CR12, A3CR13. If the power transformer T1 is operating with the proper flux density, pin 7 of A3U1 is correspondingly driven.

k. DC OUTPUT CONNECTORS AND DEVICES

The regulated dc output is fed through the output current shunt. This developed shunt voltage is applied to front panel meter M1 to display the output current of the Power Supply when S1 meter select is in the current position. When S1 is in voltage position, the meter M1 displays the voltage being supplied to the dc output connectors. If the emergency battery input is used, meter M1 will indicate voltage applied to output connector but will not indicate the battery current.

Indicator light DS1 will illuminate when the ac circuit breaker is on. DS2 and DS3 will illuminate corresponding to the output condition of the Power Supply. DS2 (Green) will illuminate when the Power Supply is providing output voltage and CB2 is in the "ON" position. If the emergency battery is connected to J5 "Battery In," DS3 (Red) will illuminate when the Power Supply detects an emergency low line condition or when there is no ac input.

Blower B1 operates whenever ac circuit breaker CB1 is in the on position and proper ac supply voltage is available. B1 will not operate from the emergency battery source.

SECTION IV. TROUBLESHOOTING

5-7 GENERAL

This section contains the authorized general support maintenance troubleshooting procedures for Power Supply PP-6224B/U.

5-8 SYMPTOM INDEX

<u>POWER SUPPLY SYMPTOM</u>	<u>PAGE</u>
1. No output	5-5
2. High output, no control	5-12
3. Output voltage drops significantly with load	5-13
4. No dc transferred to output from external battery	5-16
5. Remote sensing not operating	5-17
6. High ripple output	5-18

5-9 TROUBLESHOOTING TABLE

The troubleshooting table (Table 5-1) lists common malfunctions which may be found during operation or maintenance of the Power Supply or its components. You should perform the tests/inspections and corrective actions in the order listed.

WARNING

- *Power supplies contain high voltages. Be careful when working inside the Power Supply with the power applied to prevent electrical shock.*
- *Should the power switch be set to the OFF position, wait for capacitors to discharge before working on any item inside the Power Supply.*

Table 5-1. Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. No output.

NOTE

The following steps are performed with the ac power cord connected to a 115 vac source and the top cover removed. Remove top cover (para 5-12).

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

STEP 1. Set ac circuit breaker CB1 to ON.

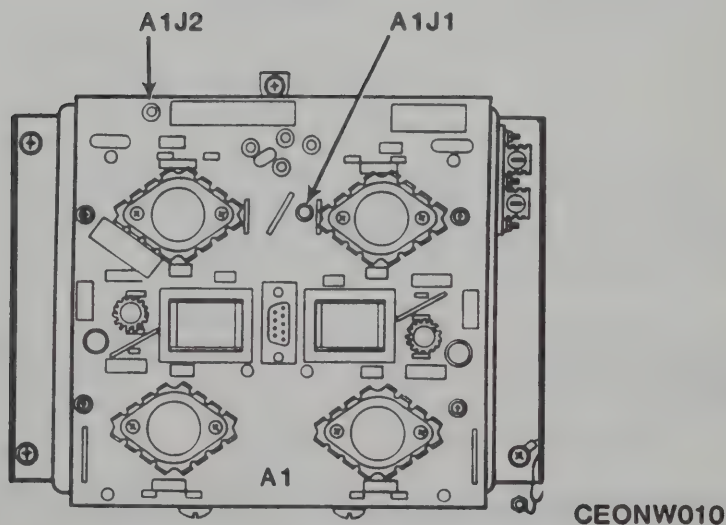
- If breaker trips, proceed to STEP 3.
- If breaker does not trip, go to STEP 2.

STEP 2. Check to see if ac input power indicator DS1 is lit.

- If indicator DS1 is not lit, remove 6 screws securing front panel to chassis (para 5-11) and check CB1 and DS1 (Fig FO-1).
- Replace defective component.
- Install front panel (para 5-11).

STEP 3. Check for defective High Voltage Rectifier and Filter Assembly A5.

- Connect positive lead of multimeter to A1J1 and the negative lead to A1J2 and check for approximately 320 vdc.



- If voltage is low or not present, replace A5 (para 5-20).

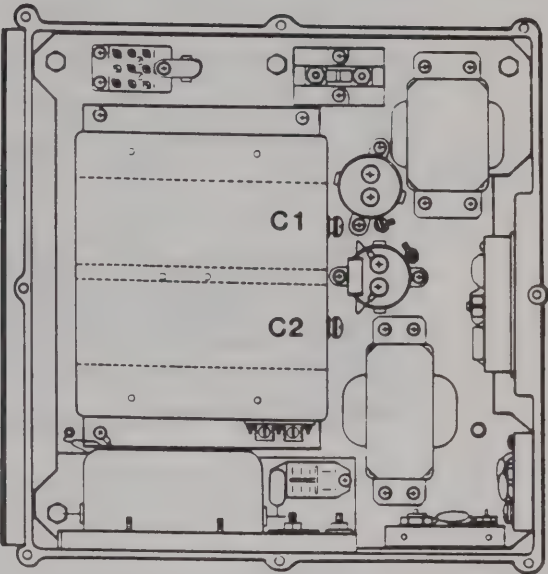
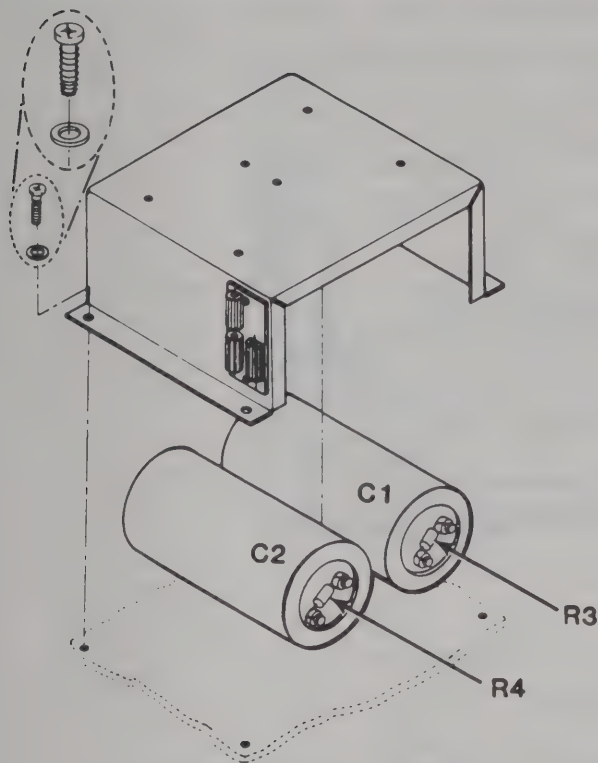
STEP 4. Check for defective capacitors C1, C2 and resistors R3, R4.

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION



CEONW011

- Set ac circuit breaker CB1 to OFF.
- Replace defective component (para 5-15).

STEP 5. Check if blower is operational.

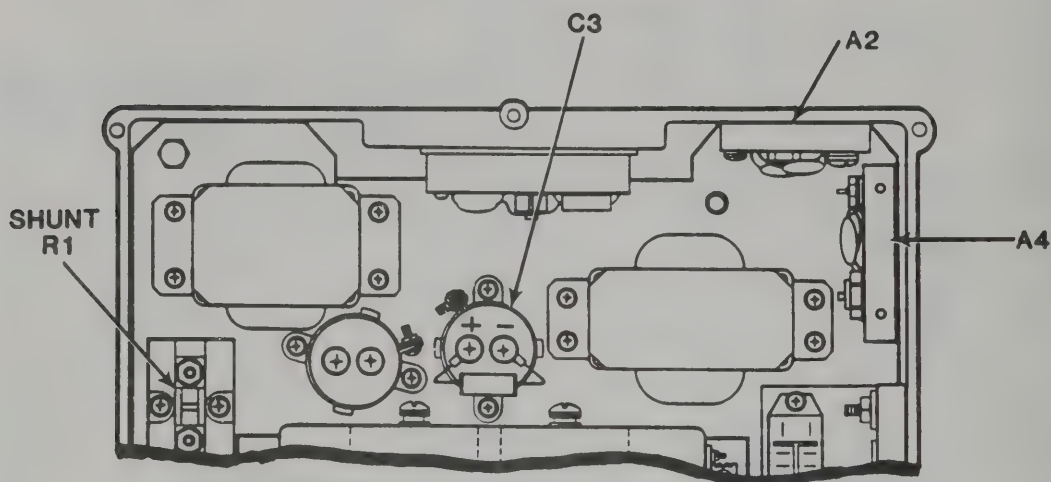
- Set ac circuit breaker CB1 to ON.
- If blower is not operating, connect positive lead of multimeter to A terminal of shunt R1 and the negative lead to the negative side C3 and check for voltage between +23 and +55 vdc.

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION



CEONW012

- If voltage is not present, go to STEP 6.
- If fan is operating, go to STEP 8.

STEP 6. Check for defective output bridge rectifier A2 and A4

- Replace defective assemblies (para 5-17)

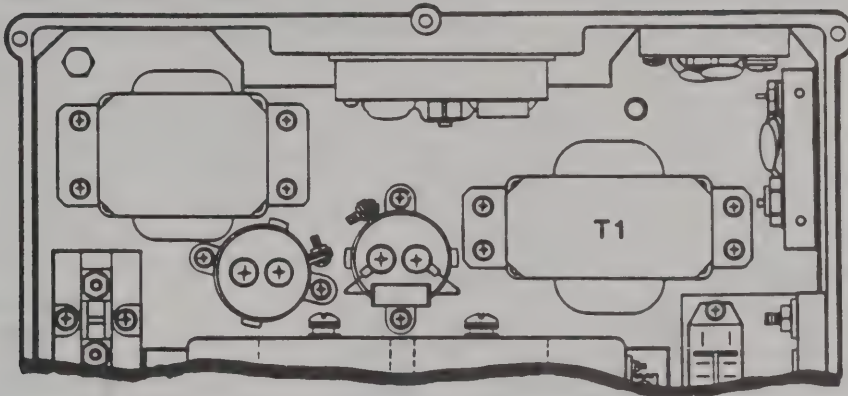
Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

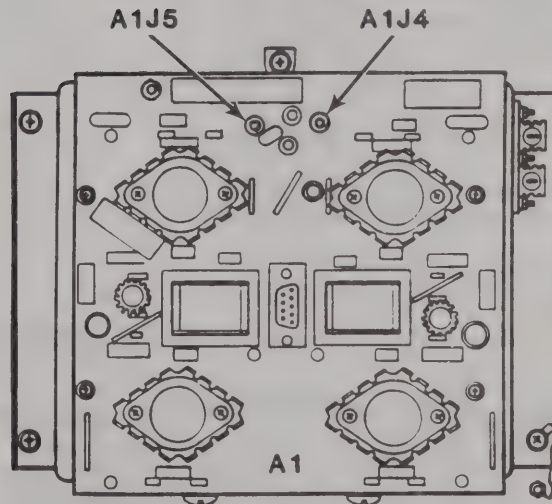
CORRECTIVE ACTION

STEP 7. Check transformer T1 (Fig. FO-1).



CEONW013

- Tag and disconnect transformer T1 primary leads (1 and 2) from switcher board A1J4 and A1J5 (Fig. FO-1).



CEONW014

- Tag and disconnect transformer T1 secondary leads (11 and 12) from output rectifier bridge A2 and A4 (Fig. FO-1).
- Check resistance between primary and secondary windings of T1. If less than 10 mΩ, replace transformer T1 (para 5-18).

Table 5-1. Troubleshooting (Cont'd)

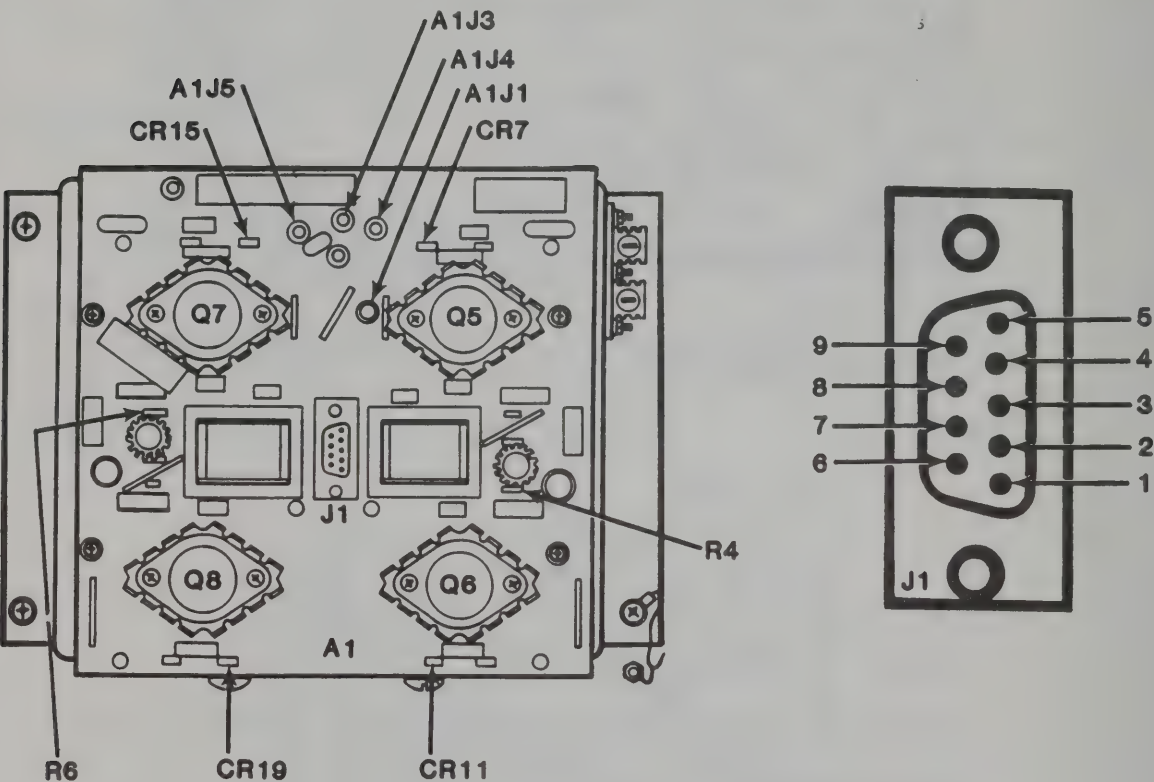
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

STEP 8. Check for defective switcher board A1.

- Set ac circuit breaker CB1 to OFF.



CEONW015

- Disconnect connector P1 from J1 by removing two screws and lockwashers.
- Tag and disconnect wires from A1J5 and A1J1 of switcher board A1.
- Perform resistance measurements as listed in In Circuit Resistance Checklist placing multimeter leads as indicated.

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION****In Circuit Resistance Checklist**

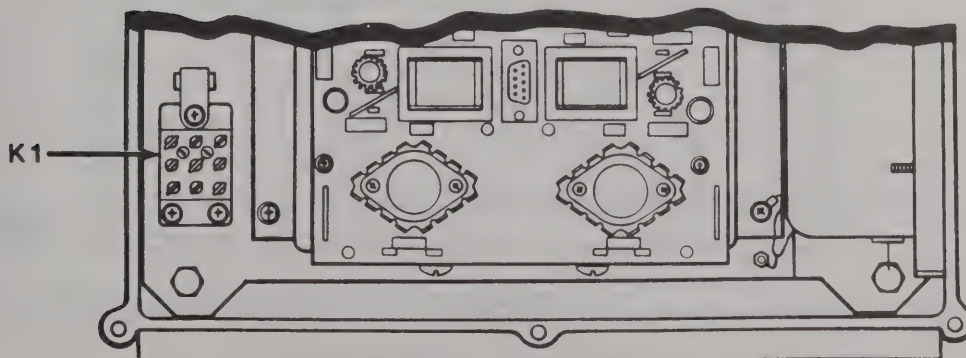
RESISTANCE MEASUREMENT POINTS		ACCEPTABLE RESISTANCE
(Positive Lead)	(Negative Lead)	READING
CR7 (cathode)	to A1J5	.40 to .70K Ω
CR7 (cathode)	to Q5 (case)	.40 to .70K Ω
CR11 (cathode)	to A1J3	.40 to .70K Ω
CR11 (cathode)	to Q6 (case)	.40 to .70K Ω
CR15 (cathode)	to A1J4	.40 to .70K Ω
CR15 (cathode)	to Q7 (case)	.40 to .70K Ω
CR19 (cathode)	to A1J3	.40 to .70K Ω
CR19 (cathode)	to Q8 (case)	.40 to .70K Ω
A1J5	to A1J1	.30 to .60K Ω *
A1J4	to A1J1	.30 to .60K Ω *
A1J3	to A1J4	.30 to .60K Ω *
A1J3	to A1J5	.30 to .60K Ω *
J1-7	to J1-5	.55 to .85K Ω
J1-7	to R6	.55 to .85K Ω
J1-2	to J1-5	.55 to .85K Ω
J1-2	to R4	.55 to .85K Ω
J1-5	to R4	.50 to .80K Ω
J1-5	to R6	.50 to .80K Ω
J1-4	to R4	.55 to .85K Ω
J1-4	to J1-5	.60 to .90K Ω
J1-9	to R6	.55 to .85K Ω
J1-9	to J1-5	.60 to .90K Ω

NOTE

* These four readings should be within 10% of each other.

- If any resistance measurement is out of tolerance, replace switcher board assembly A1 (para 5-14).

STEP 9. Check power transfer relay K1 (Fig. FO-1).



CEONW016

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

- Replace power transfer relay K1 if defective (para 5-21).

STEP 10. Check for defective dc circuit breaker CB2.

- Remove six screws securing front panel to chassis (para 5-11) and check CB2 (Fig. FO-1).
- Replace CB2 if defective (para 5-29).
- Install front panel (para 5-11).

2. High output, no control.

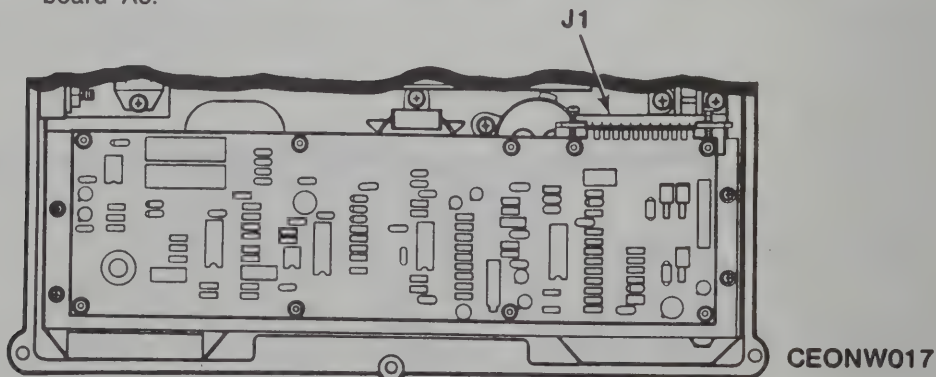
NOTE

The following steps are performed with ac input applied. The top cover is also removed. Remove top cover (para 5-12). If this high output condition occurs only when using the remote sensing capability, proceed to the malfunction "5. Remote sensing not operating."

STEP 1. Check for defective dc adjust potentiometer R2.

- Remove six screws securing front panel to chassis (para 5-11) and check dc adjust potentiometer R2 (0 to 10K Ω).
- Replace R2 if defective (para 5-27).

STEP 2. Check for proper orientation and seating of connector J1 on control board A3.



- If malfunction is still present, replace control board A3 (para 5-16).

Table 5-1. Troubleshooting (Cont'd)

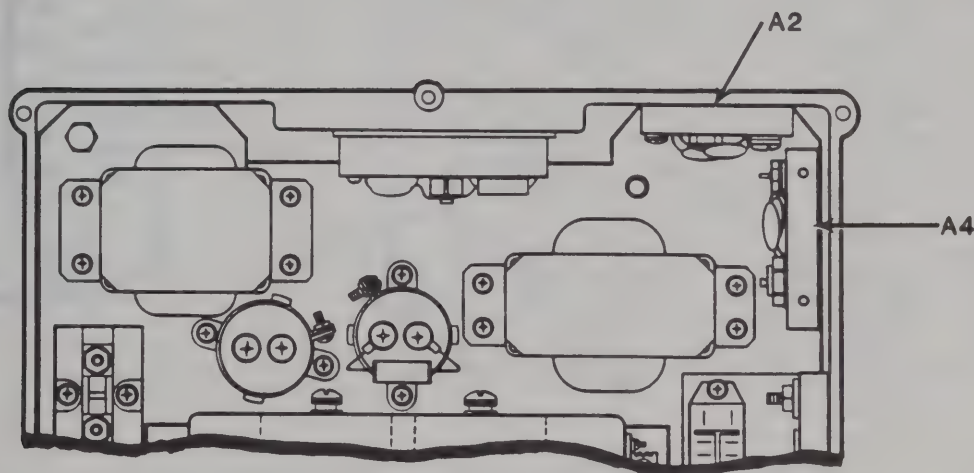
MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

3. Output voltage drops significantly with load.

NOTE

The following steps are performed with the power cord connected to a 115 vac source and both the dc and ac circuit breakers set to the ON position and with the top cover removed. Remove top cover (para 5-12).

- STEP 1. Check for defective output bridge rectifier A2 and A4.



CEONW018

- Replace defective assemblies (para 5-17).

- STEP 2. Check for defective switcher board A1.

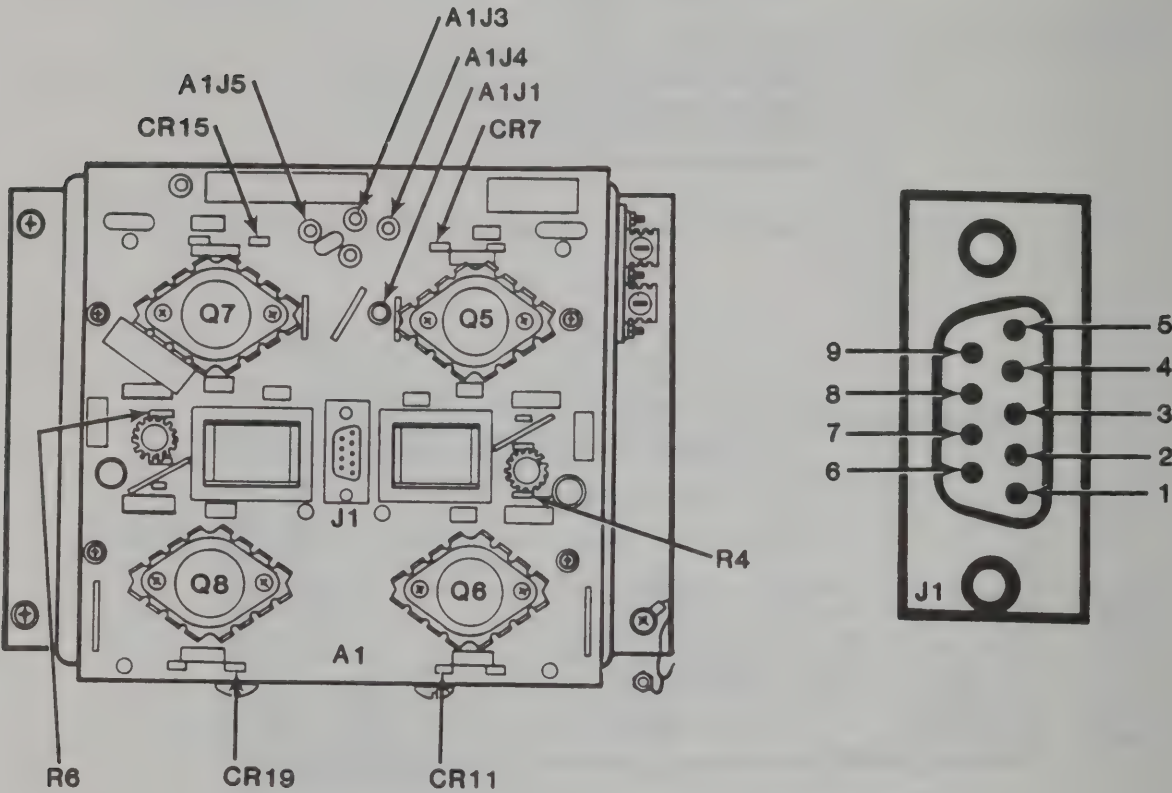
- Set ac circuit breaker to OFF.

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION



CEONW015

- Disconnect connector P1 from J1 by removing two screws and lockwashers.
- Tag and disconnect wires from A1J5 and A1J1 of switcher board A1.
- Perform resistance measurements as listed in In Circuit Resistance Checklist placing multimeter leads as indicated.

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

In Circuit Resistance Checklist

RESISTANCE MEASUREMENT POINTS		ACCEPTABLE RESISTANCE
(Positive Lead)	(Negative Lead)	READING
CR7 (cathode) to A1J5		.40 to .70K Ω
CR7 (cathode) to Q5 (case)		.40 to .70K Ω
CR11 (cathode) to A1J3		.40 to .70K Ω
CR11 (cathode) to Q6 (case)		.40 to .70K Ω
CR15 (cathode) to A1J4		.40 to .70K Ω
CR15 (cathode) to Q7 (case)		.40 to .70K Ω
CR19 (cathode) to A1J3		.40 to .70K Ω
CR19 (cathode) to Q8 (case)		.40 to .70K Ω
A1J5 to A1J1		.30 to .60K Ω *
A1J4 to A1J1		.30 to .60K Ω *
A1J3 to A1J4		.30 to .60K Ω *
A1J3 to A1J5		.30 to .60K Ω *
J1-7 to J1-5		.55 to .85K Ω
J1-7 to R6		.55 to .85K Ω
J1-2 to J1-5		.55 to .85K Ω
J1-2 to R4		.55 to .85K Ω
J1-5 to R4		.50 to .80K Ω
J1-5 to R6		.50 to .80K Ω
J1-4 to R4		.55 to .85K Ω
J1-4 to J1-5		.60 to .90K Ω
J1-9 to R6		.55 to .85K Ω
J1-9 to J1-5		.60 to .90K Ω

NOTE

* These four readings should be within 10% of each other.

- If any resistance measurement is out of tolerance, replace switcher board assembly A1 (para 5-14).

STEP 3. Check proper adjustment of control board A3.

- Perform current limiting adjustment (para 5-40).

STEP 4. Perform regulation test (para 5-35).

- If test fails, replace control board A3 (para 5-16).

Table 5-1. Troubleshooting (Cont'd)

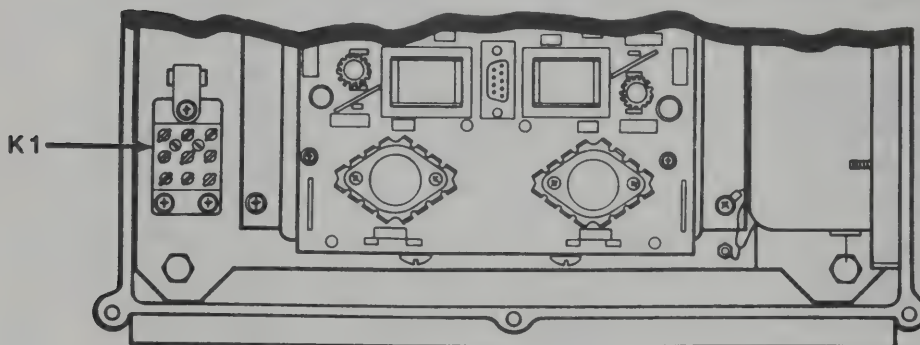
MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

4. No dc transferred to output from external battery.

NOTE

The following steps are performed without ac input applied. A 24 V source is connected to rear panel connector J5. Dc circuit breaker CB2 must be set to the ON position. The top cover is also removed. remove top cover (para 5-12).

- STEP 1. Check for defective power transfer relay K1 (Fig. FO-1)

**CEONW016**

- Replace power transfer relay K1 if defective (para 5-21).

- STEP 2. Check for defective dc circuit breaker CB2.

- Remove six screws securing front panel to chassis (para 5-11) and check CB2 (Fig. FO-1).

- STEP 3. Check for defective dc emer DS3 indicator.

- If indicator is not lit, remove six screws securing front panel to chassis (para 5-11) and check DS3.
- Replace DS3 if defective (para 5-30)

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

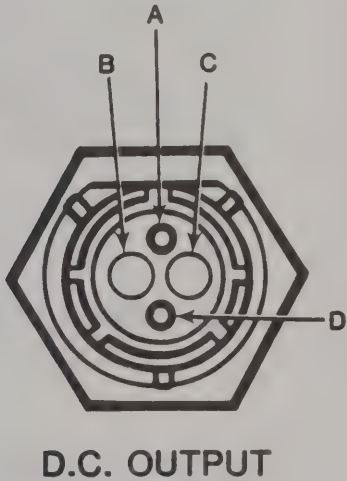
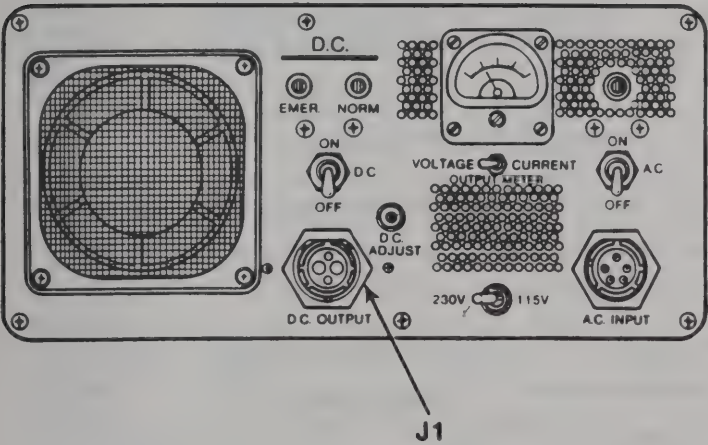
CORRECTIVE ACTION

5. Remote sensing not operating.

NOTE

The following steps are performed without ac input applied and with the top cover removed. Remove top cover (para 5-12).

Check for proper cable polarity and continuity of dc output connector J1 (Fig. FO-1).



CEONW019

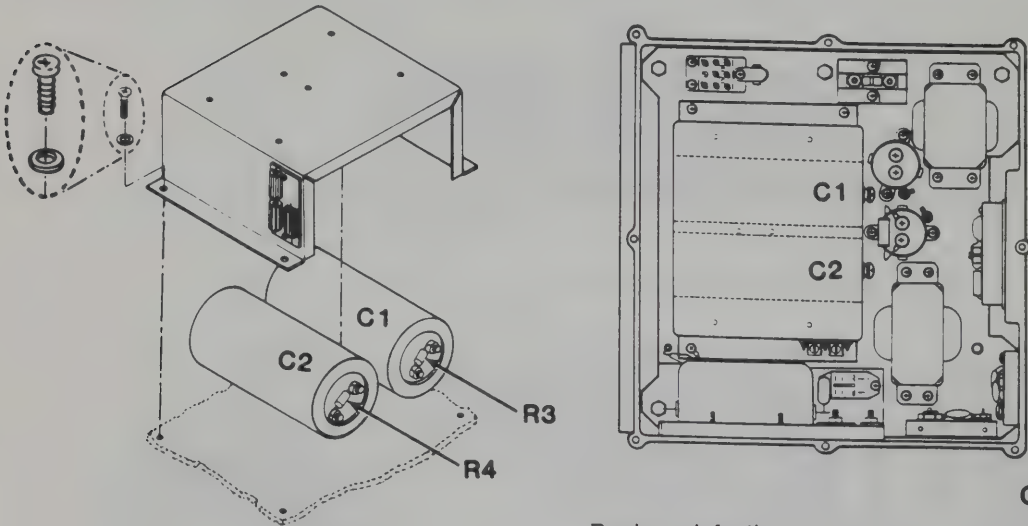
- Replace connector J1 (para 5-25) or wiring if defective.
- If the result of cable polarity and continuity of dc output connector J1 check is good, replace control board A3 (para 5-16).

Table 5-1. Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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6. High ripple output.

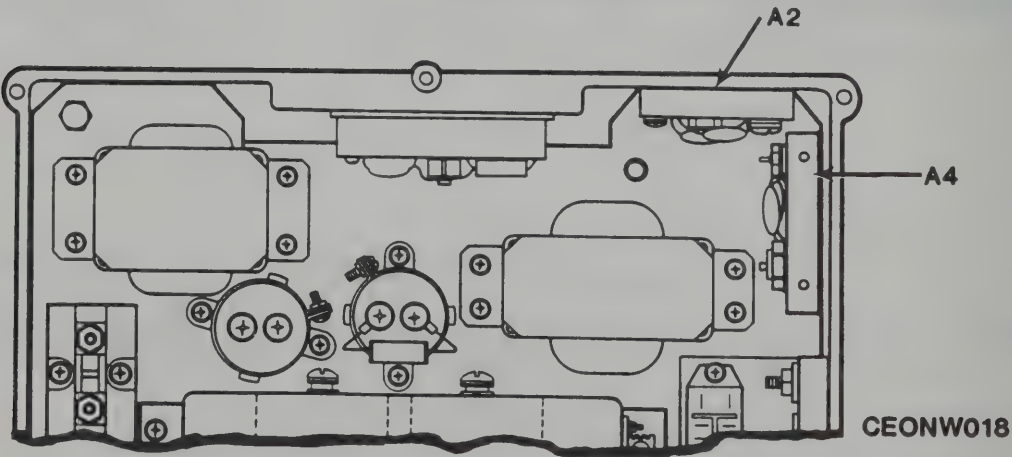
STEP 1. Check capacitors C1, C2 and resistors R3, R4.



- Replace defective component.

STEP 2. Check capacitors C1 and C2 mounted on circuit board A4.

- Replace defective assemblies (para 5-17).



STEP 3. Check capacitors C1, C2, C3 and C4 mounted on circuit board A2.

- Replace defective assemblies (para 5-17).

SECTION V. MAINTENANCE PROCEDURES

5-10 GENERAL

This section contains the authorized general support maintenance procedures.

PROCEDURE	PARA	PAGE
Removal and Replacement Procedures		
Replace Front Panel	5-11	5-20
Replace Top Cover	5-12	5-21
Replace Insulating CAUTION Plate	5-13	5-22
Replace Switcher Board Assembly A1 and Insulating Plate	5-14	5-23
Replace Capacitors C1, C2 and C5 and Resistors R3, R4, R5, R6 and R7	5-15	5-24
Replace Control Board Assembly A3	5-16	5-26
Replace Output Bridge Rectifier Assembly A2 or A4	5-17	5-27
Replace Transformer T1	5-18	5-28
Replace Choke L1	5-19	5-29
Replace High Voltage Rectifier and Filter Assembly A5	5-20	5-30
Replace Transfer Relay K1 and Resistor R9	5-21	5-31
Replace Connectors J3, J4 and J5	5-22	5-32
Replace Fan B1	5-23	5-34
Replace Ac Input Connector J2 (Front Panel)	5-24	5-35
Replace Dc Output Connector J1 (Front Panel)	5-25	5-36
Replace 230 V/115 V Switch S1 or Voltage/Current Switch S2	5-26	5-37
Replace Dc Adjust Potentiometer R2	5-27	5-38
Replace Output Meter M1	5-28	5-39
Replace Dc Circuit Breaker CB2 and Ac Circuit Breaker CB1	5-29	5-40
Replace Ac Indicator DS1, Emer Indicator Lamp DS3 and Norm Indicator Lamp DS2	5-30	5-41
Replace Shunt R1	5-31	5-42
Replace Capacitors C3 and C4 and Resistor R8	5-32	5-43
Replace Capacitors C6, C7 and C8 and Filters FL1, FL4, FL5 and L2	5-33	5-44
Performance Tests		
Output Range Test	5-34	5-47
Regulation Test	5-35	5-49
Over-current Protection Test	5-36	5-53
Ripple Test	5-37	5-55
Power Transfer Test	5-38	5-57
Remote Sensing Test	5-39	5-59
Adjustment Procedures		
Adjustment of Control Board A3 Current Limiting Action A3R11	5-40	5-61

5-11 REPLACE FRONT PANEL

DESCRIPTION:

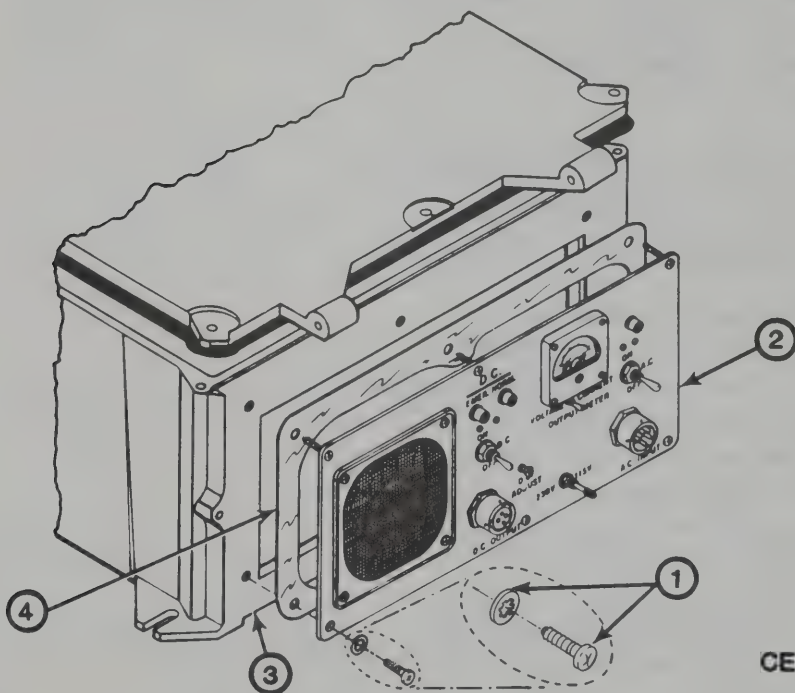
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers (1) securing front panel (2) to chassis (3). Lower front panel (2). Retain gasket (4) should it become disengaged from front panel (2).
2. Perform Removal Procedures in paragraphs 5-23 through 5-30.



CEONW020

INSTALL

1. Perform Installation Procedures in paragraphs 5-23 through 5-30.
2. Align front panel (2) and gasket (4) and install and tighten six screws and washers (1) securing front panel (2) to chassis (3).
3. Connect all power cables.

END OF TASK

5-12 REPLACE TOP COVER**DESCRIPTION:**

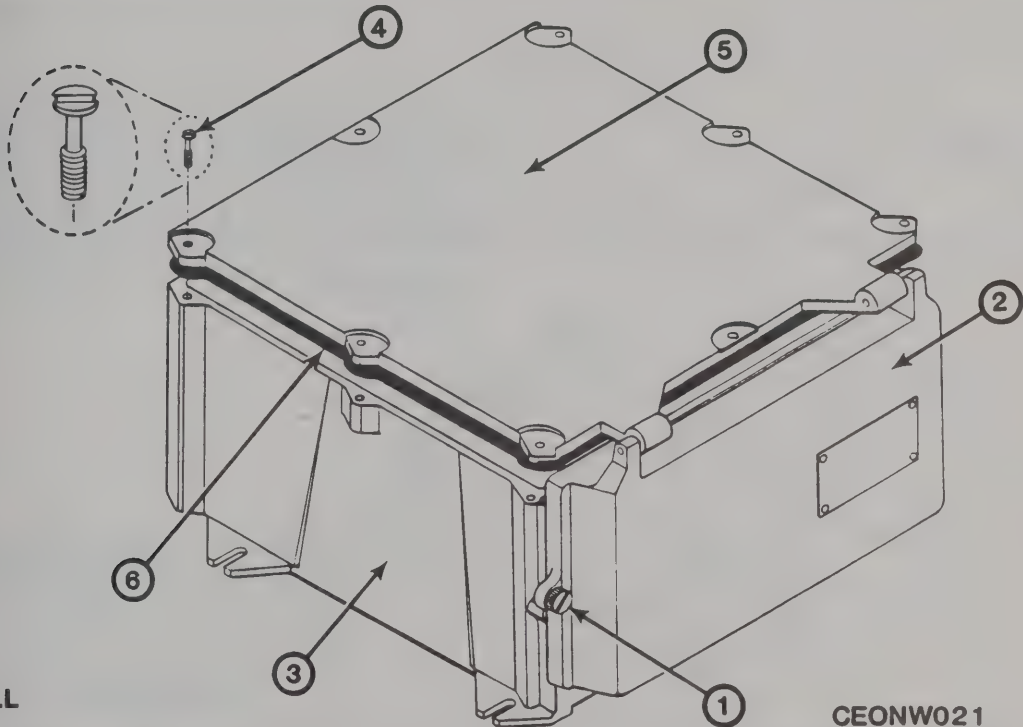
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Loosen two knurled captive screws (1) on both sides of front panel cover (2) until front panel cover is free of case (3).
2. Remove eight captive screws (4) until top cover (5) is free of case (3). Retain gasket (6) should it become disengaged from top cover (5).

**INSTALL**

1. Place gasket (6) upon case (3) so that all gasket holes are aligned with holes in case (3).
2. Place top cover (5) upon gasket (6). Install eight captive screws (4). Hand tighten, for proper alignment with case (3). Once aligned, fully tighten with screwdriver.
3. Align front panel cover (2) with front panel and engage and tighten the two knurled captive screws (1).
4. Connect all power cables.

END OF TASK

5-13 REPLACE INSULATING CAUTION PLATE

DESCRIPTION:

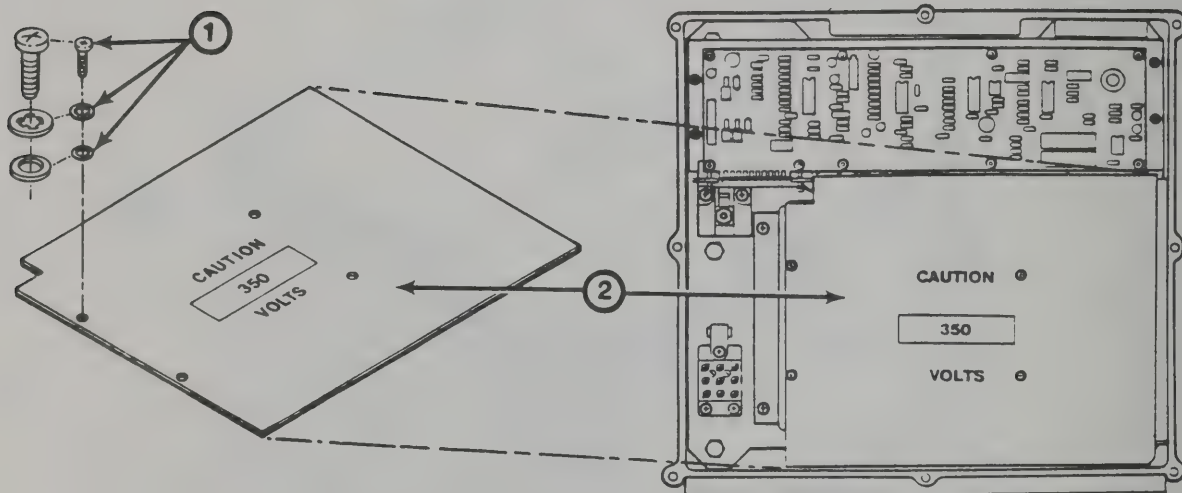
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove four screws, star washers and flat washers (1) from insulating CAUTION plate (2).



CEONW022

INSTALL

1. Install and tighten four screws, star washers and flat washers (1) securing CAUTION plate (2)
2. Install top cover (para 5-12).
3. Connect all power cables.

END OF TASK

5-14 REPLACE SWITCHER BOARD ASSEMBLY A1 AND INSULATING PLATE**DESCRIPTION:**

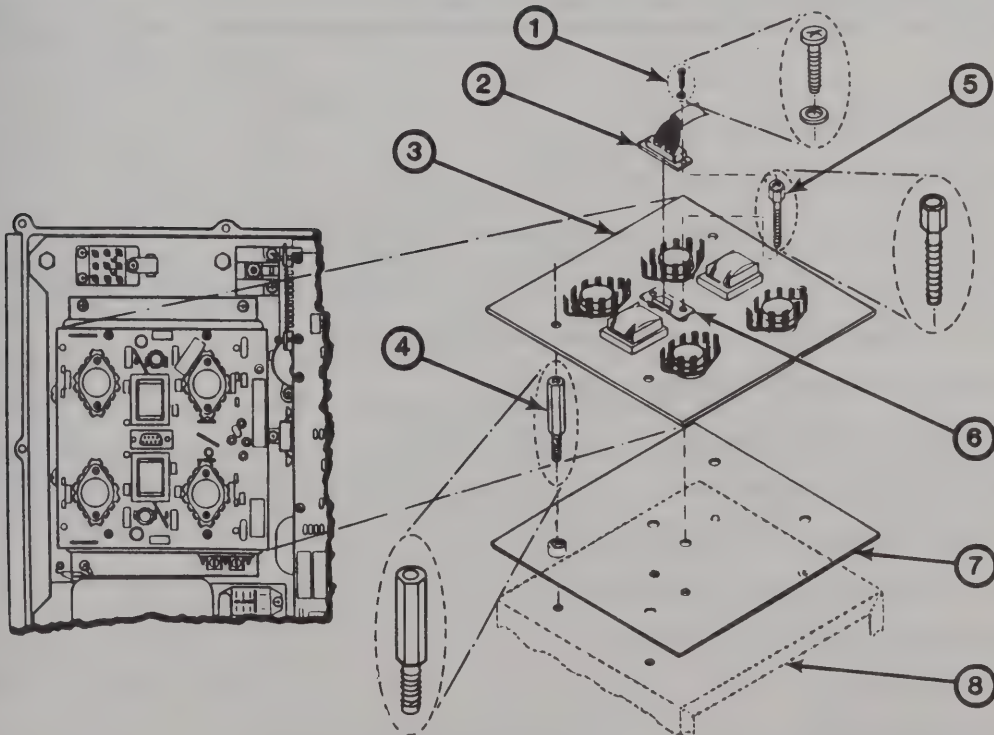
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove insulating CAUTION plate (para 5-13).
3. Remove two screws and lockwashers (1) securing A1P1 (2) to switcher board A1 (3).
4. Remove A1P1 (2) from A1J1 (6).
5. Tag and disconnect all wires on switcher board A1 (3).
6. Remove four stand-off screws (4) from switcher board A1 (3)
7. Remove two stand-off screws (5) from A1J1 (6).
8. Remove switcher board A1 (3) and insulating plate (7) from capacitor assembly housing (8).



CEONW023

INSTALL

1. Align insulating plate (7) and switcher board A1 (3) to capacitor assembly housing (8).
2. Install and tighten two stand-off screws (5) on A1J1 (6).
3. Install and tighten four stand-off screws (4) on switcher board A1 (3).
4. Connect all wires on switcher board A1 (3).
5. Install A1P1 connector (2) to A1J1 connector (6).
6. Install and tighten two screws and lockwashers (1) securing A1P1 (2) to switcher board A1 (3).
7. Install insulating CAUTION plate (para 5-13).
8. Install top cover (5-12).
9. Connect all power cables.

END OF TASK

5-15 REPLACE CAPACITORS C1, C2 AND C5 AND RESISTORS R3, R4, R5, R6 AND R7

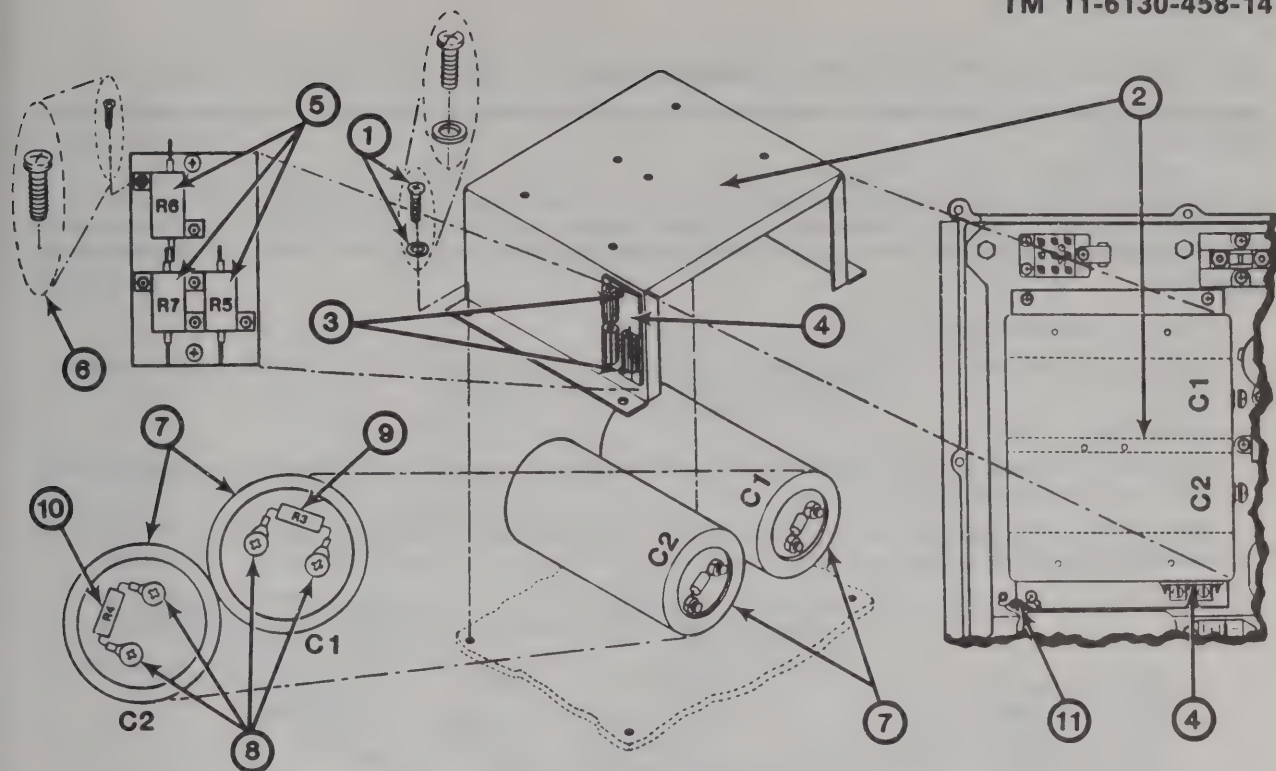
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove insulating CAUTION plate (para 5-14).
3. Remove switcher board assembly A1 and insulating plate (para 5-13).
4. Remove four screws and washers (1) and partially lift capacitor assembly housing (2).
5. Remove two screws (3) and remove resistor mounting plate (4).
6. Carefully remove capacitor assembly housing (2).
7. Unsolder and tag wires connected to R5, R6 and R7 (5).
8. Remove six mounting screws and nuts (6) and remove R5, R6 and R7 (5).
9. Tag all wires connected to C1 and C2 (7).
10. Remove four screws (8) from C1 and C2 (7).
11. Remove wiring and R3 (9) and R4 (10).
12. Remove C1 and C2 (7).
13. Unsolder and remove C5 (11).



CEONW024

INSTALL

1. Connect and solder C5 (11).
2. Replace wiring and R3 (9) and R4 (10).
3. Install and tighten four screws (8) to C1 and C2 (7).
4. Connect and solder all wires to C1 and C2 (7).
5. Install and tighten six mounting screws (6) securing R5, R6 and R7 (5).
6. Connect and solder all wires to R5, R6 and R7 (5).
7. Partially install capacitor assembly housing (2).
8. Install and tighten two screws (3) securing resistor mounting plate (4).
9. Carefully install capacitor assembly housing (2) and install and tighten four screws and washers (1) securing capacitor assembly housing (2).
10. Install switcher board assembly A1 and insulating plate (para 5-14).
11. Install insulating CAUTION plate (para 5-13).
12. Install top cover (para 5-12)
13. Connect all power cables.

END OF TASK

5-16 REPLACE CONTROL BOARD ASSEMBLY A3

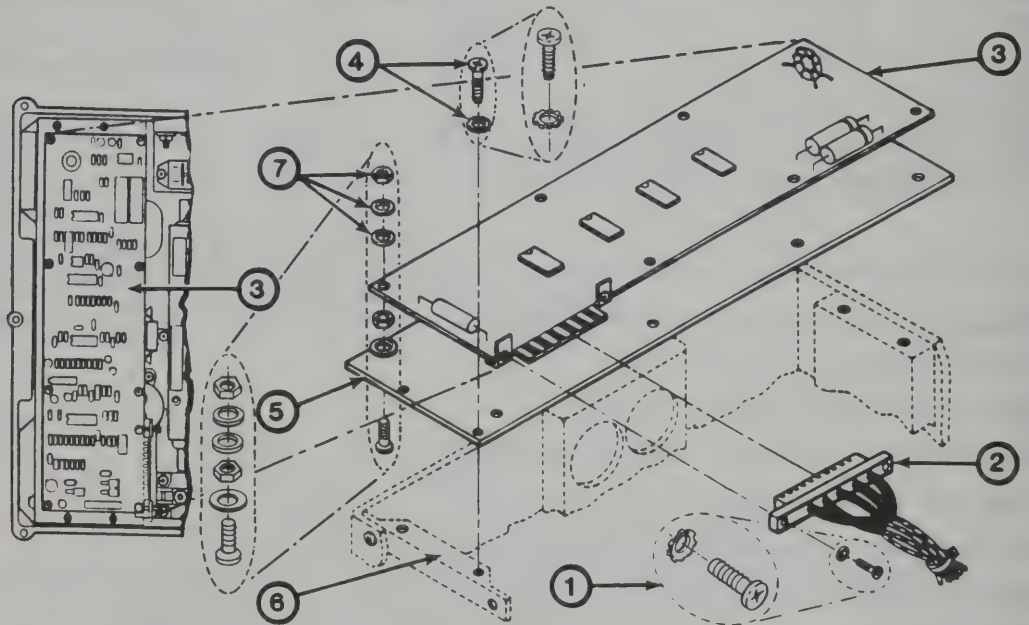
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12)
2. Remove two screws and lockwashers (1) securing J1 connector (2) to control board assembly A3 (3).
3. Disconnect J1 (2).
4. Remove four screws and washers (4) securing A3 mounting board (5) to the chassis (6) and remove A3 and mounting board (5).
5. Remove nine nuts, star washers and flat washers (7) and remove control board assembly A3 (3) from A3 mounting board (5).



CEONW025

INSTALL

1. Install nine flat washers and star washers and install and tighten nine nuts (7) securing control board assembly A3 (3) to mounting board (5).
2. Install A3 mounting board (5) to the chassis (6) and install and tighten four screws and washers (4) securing A3.
3. Connect J1 (2).
4. Install and tighten two screws and lockwashers (1) securing J1 (2).
5. Install top cover (para 5-12).
6. Connect all power cables.

END OF TASK

5-17 REPLACE OUTPUT RECTIFIER ASSEMBLY A2 OR A4**DESCRIPTION:**

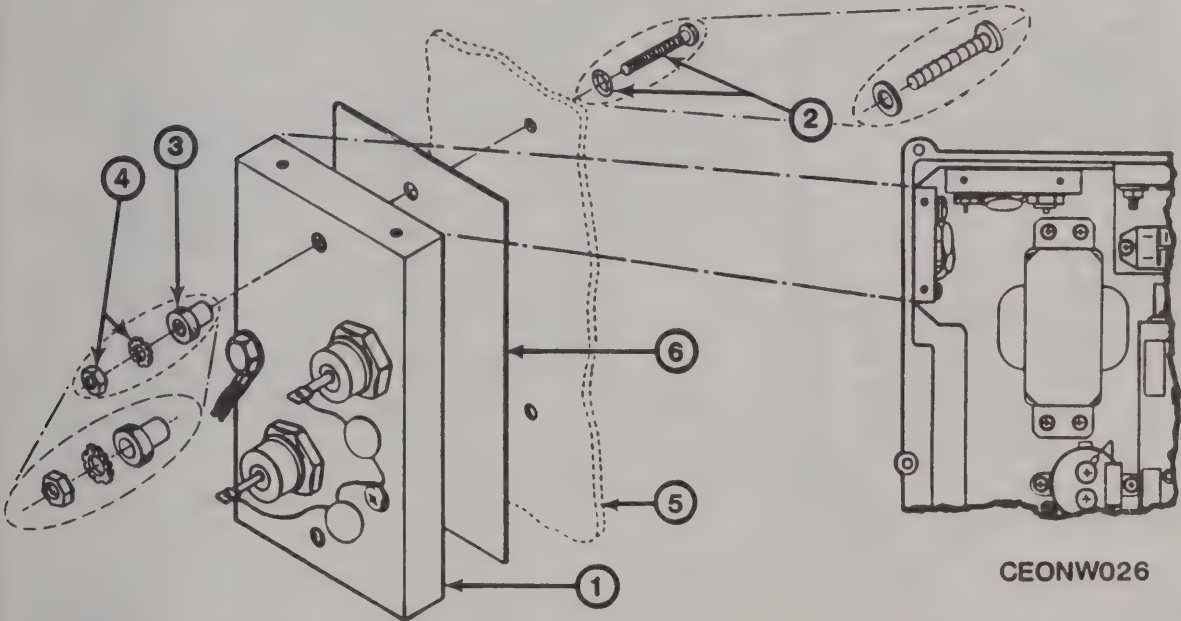
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE**NOTE**

If A2 or A4 are found defective, both output bridge rectifier assemblies A2 and A4 must be replaced.

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Disconnect and tag all wires to components on output bridge rectifier assemblies A2 or A4 (1).
4. Remove two screws and gasket (2), insulator bushings (3), and hex nuts and star washers (4) that mount output bridge rectifier A2 or A4 (1) to the main chassis (5).
5. Remove insulator pad (6) and retain for reassembly.

**INSTALL**

1. Align the output bridge rectifier assemblies A2 or A4 (1) and insulator pad (6) with the main chassis (5). Install and tighten two screws and gaskets (2), insulator bushings (3), and hex nuts and star washers (4).
2. Connect all wires to components on output bridge rectifier assemblies A2 or A4 (1) as tagged.
3. Install control board assembly A3 (para 5-16).
4. Install top cover (para 5-12).
5. Connect all power cables.

END OF TASK

5-18 REPLACE TRANSFORMER T1

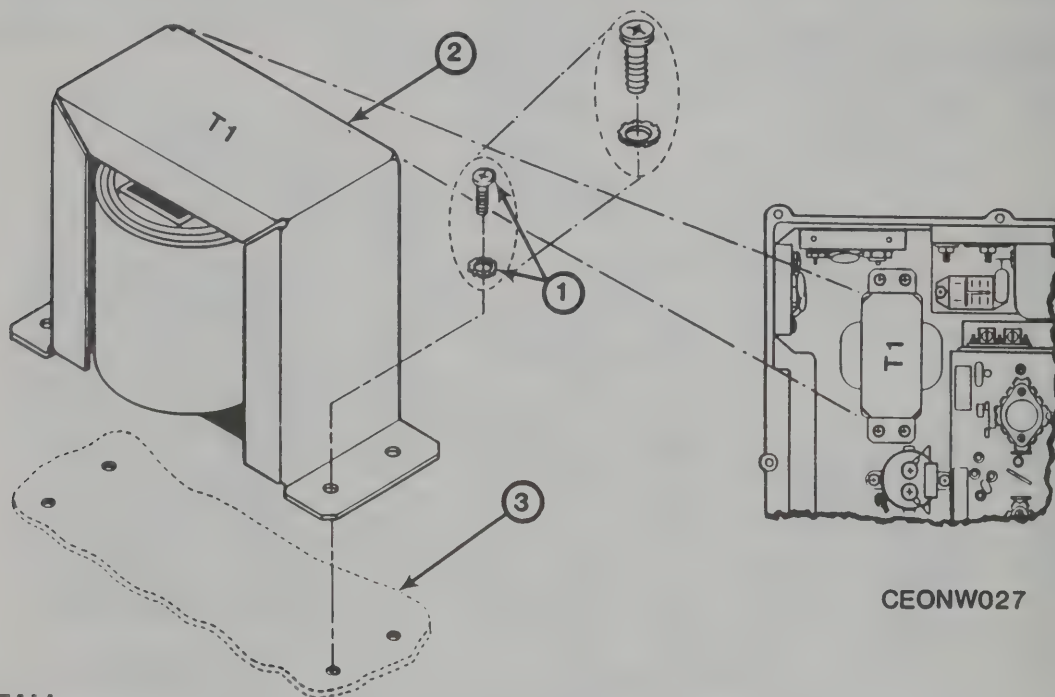
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Remove four screws and lockwashers (1) that mount transformer T1 (2) to main chassis (3).
4. Disconnect and tag all wires from transformer T1 (2) (Fig. FO-1).
5. Remove transformer T1 (2) from main chassis (3).



INSTALL

1. Mount transformer T1 (2) to main chassis (3). Install and tighten four screws and lockwashers (1).
2. Connect all wires from transformer T1 (2) as tagged (Fig. FO-1)
3. Install control board assembly A3 (5-16).
4. Install top cover (para 5-12).
5. Connect all power cables.

END OF TASK

5-19 REPLACE CHOKE L1

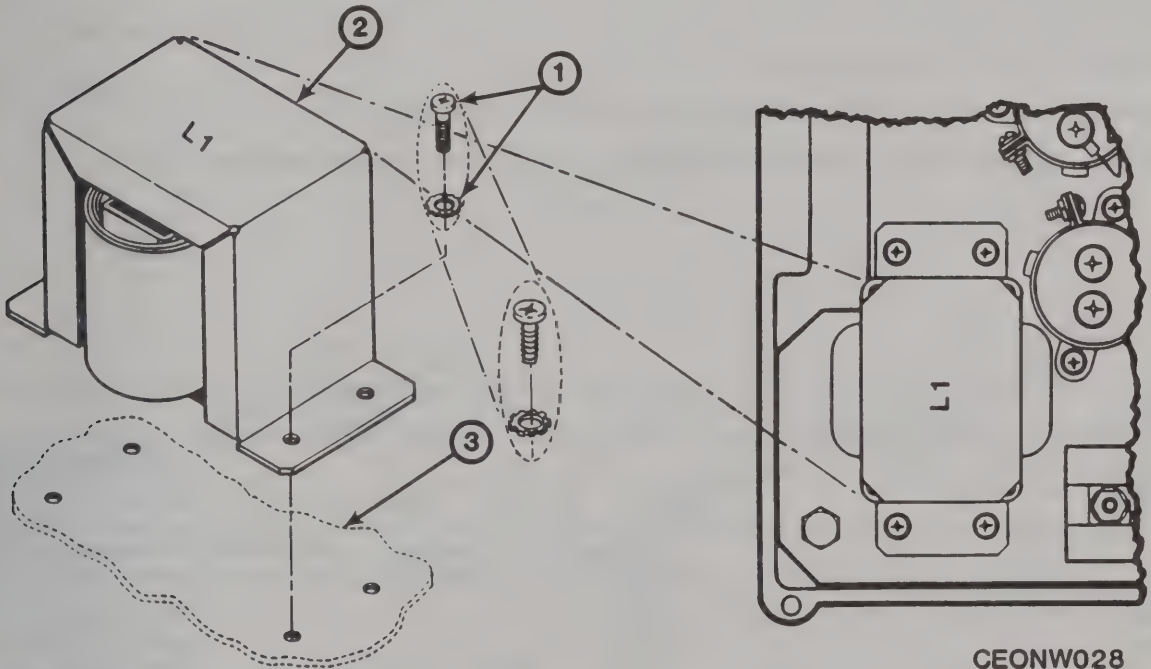
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Remove four screws and lockwashers (1) that mount choke L1 (2) to main chassis (3).
4. Disconnect and tag all wires from choke L1 (2).
5. Remove choke L1 (2) from main chassis (3).



INSTALL

1. Mount choke L1 (2) to main chassis (3). Install and tighten four screws and lockwashers (1).
2. Connect all wires from choke L1 (2) as tagged.
3. Install control board assembly A3 (para 5-16).
4. Install top cover (para 5-12).
5. Connect all power cables.

END OF TASK

5-20 REPLACE HIGH VOLTAGE RECTIFIER AND FILTER ASSEMBLY A5

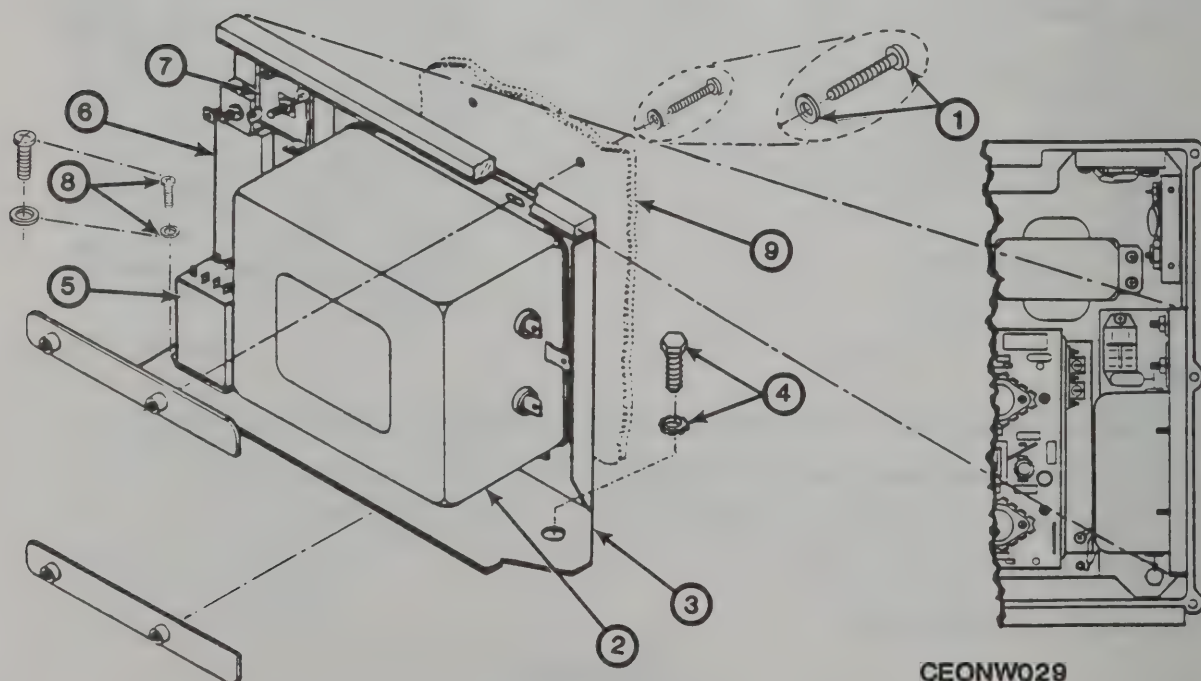
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove insulating CAUTION plate (para 5-13).
3. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
4. Remove four screws and gaskets (1) from outside of chassis (9) securing EMI filter (2) to assembly A5 (3).
5. Unsolder and tag all wires on EMI filter (2).
6. Remove EMI filter (2).
7. Remove hex bolt and washer (4).
8. Unsolder and tag all wires from A5K1 (5), A5R1 (6) and A5BR1 (7).
9. Remove two screws and washers (8) securing A5K1 (5) and remove assembly A5 (3).



CEONW029

INSTALL

1. Set assembly A5 (3) in place.
2. Set A5K1 (5) in place. Install and tighten two screws and washers (8) securing A5K1 (5).
3. Connect and solder all wires to A5K1 (5), A5R1 (6) and A5BR1 (7) as tagged.
4. Install and tighten hex bolt and washer (4).
5. Connect and solder all wires to EMI filter (2) as tagged.
6. Install and secure EMI filter (2) with four screws and gaskets (1).
7. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
8. Install insulating CAUTION plate (5-13).
9. Install top cover (para 5-12).
10. Connect all power cables.

END OF TASK**5-21 REPLACE TRANSFER RELAY K1 AND RESISTOR R9**

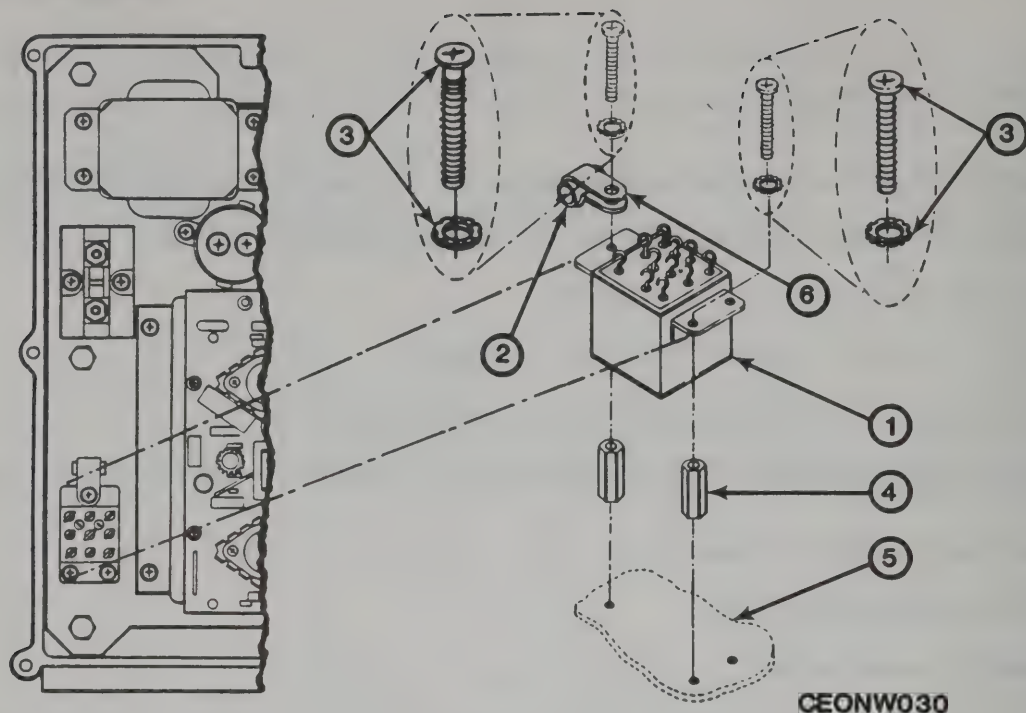
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove insulating CAUTION plate (para 5-13).
3. Unsolder and tag all wires to relay K1 (1) and resistor R9 (2).
4. Remove three screws and lockwashers (3) which mount relay K1 (1) on stand-offs (4) to chassis (5).
5. Remove resistor R9 (2) from clamp (6).
6. Remove relay K1 (1).



INSTALL

1. Align relay K1 (1) and stand-offs (4) to chassis (5).
2. Install resistor R9 (2) in clamp (6).
3. Install clamp (6) and install and tighten three screws and lockwashers (3) securing relay K1 (1) to chassis (5).
4. Connect and solder all wires to relay K1 (1) and resistor R9 (2) as tagged.
5. Install insulating CAUTION plate (para 5-13).
6. Install top cover (para 5-12).
7. Connect all power cables.

END OF TASK

5-22 REPLACE CONNECTORS J3, J4 AND J5

DESCRIPTION:

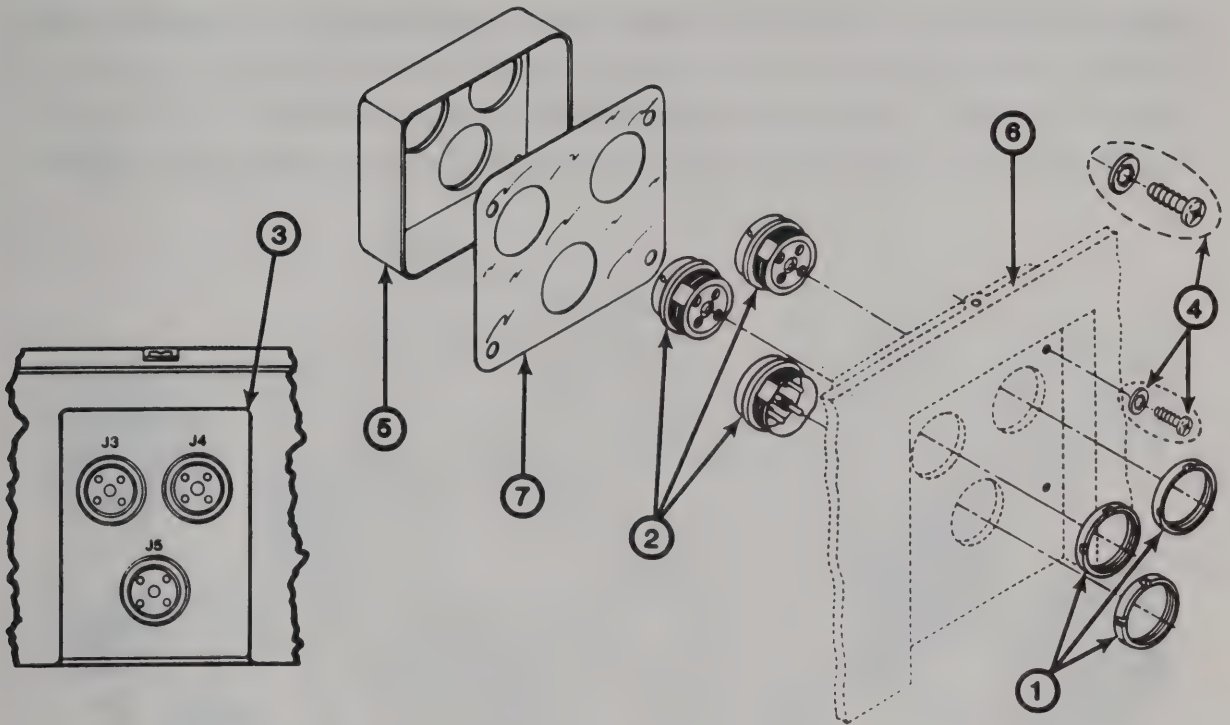
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).

3. Remove three ring nuts (1) from connectors J3, J4 and J5 (2) on rear panel (3).
4. Remove four screws and gaskets (4) securing connector assembly (5) to chassis (6).
5. Pull connector assembly (5) away from rear panel (3).
6. Pull connector (2) out of connector assembly (5).
7. Unsolder and tag all wires from connector (2) and remove connector (2).



INSTALL

CEONW031

1. Install connector (2) and solder all wires as tagged.
2. Install gasket (7) on connectors (2).
3. Align and install connector (2) and gasket (7) on chassis (6) and install ring nuts (1).
4. Install connector assembly (5) on rear panel (3) and install and tighten four screws and gaskets (4).
5. Install control board assembly A3 (para 5-16).
6. Install top cover (para 5-12).
7. Connect all power cables.

END OF TASK

5-23 REPLACE FAN BELT

DESCRIPTION:

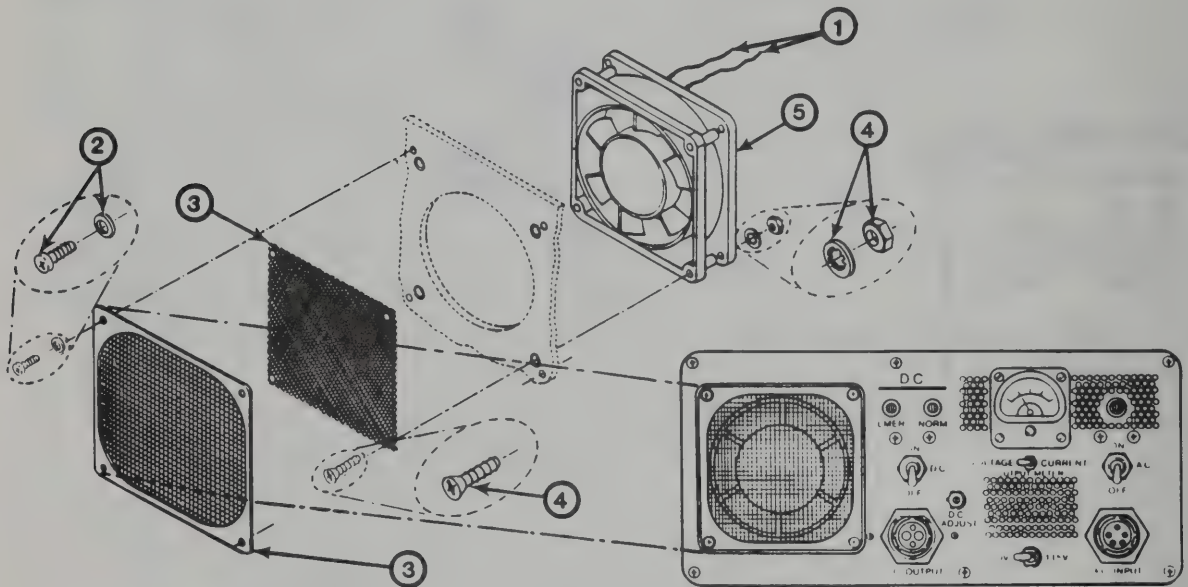
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder positive and negative fan lead wires (1) and note location.
3. Remove four screws, lockwashers and nuts (3) securing cover and filter (3).
4. Remove four screws, lockwashers and nuts (4) securing fan (5) to front panel (6). Remove fan (5).



CEONW032

INSTALL

1. Secure fan (5) to front panel (6). Install and tighten four screws, lockwashers and nuts (4).
2. Connect and solder negative and positive fan lead wires (1).
3. Install cover and filter (3) on front panel (6). Install four screws, lockwashers and nuts (2).
4. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables.

END OF TASK

5-24 REPLACE AC INPUT CONNECTOR J2 (FRONT PANEL)

DESCRIPTION:

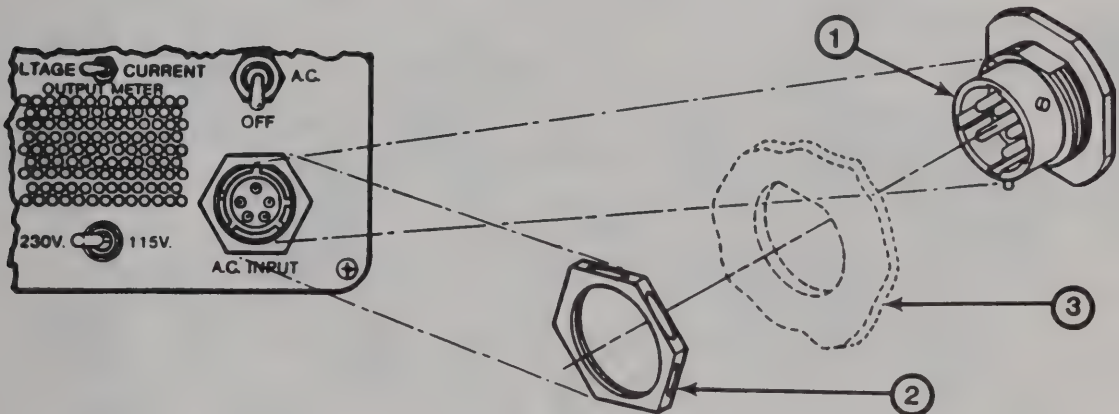
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder and tag all wires from connector J2 (1).
3. Remove hex nut (2) from connector J2 (1) from front of panel (3).
4. Remove connector J2 (1) from rear of front panel (3).



CEONW033

INSTALL

1. Install connector J2 (1) to rear of front panel (3).
2. Install and tighten hex nut (2) on connector J2 (1).
3. Connect and solder all wires to rear of connector J2 (1) as tagged.
4. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables.

END OF TASK

5-25 REPLACE DC OUTPUT CONNECTOR J1 (FRONT PANEL)

DESCRIPTION:

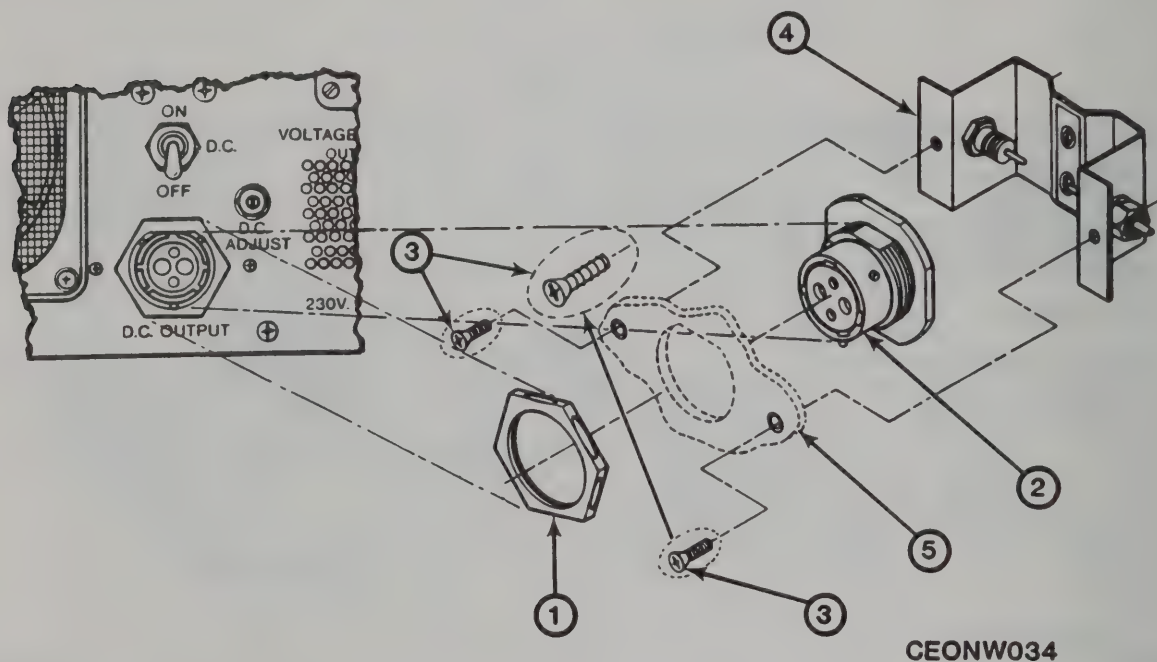
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Remove hex nut (1) from connector J1 (2).
3. Remove two screws (3) securing filter unit (4) to front panel (5).
4. Remove connector J1 (2) and filter unit (4).
5. Unsolder filter unit (4) connections and remove connector J1 (2).



INSTALL

1. Solder filter unit (4) connections to connector J1 (2).
2. Install filter unit (4) and connector J1 (2) in front panel (5).
3. Install and tighten two screws (3) securing filter unit (4) to front panel (5).
4. Install and tighten hex nut (1) securing connector J1 (2).
5. Align front panel and gasket and install and tighten six screws and washers securing front panel to chassis (para 5-11).
6. Connect all power cables.

END OF TASK

5-26 REPLACE 230 V/115 V SWITCH S1 OR VOLTAGE/CURRENT SWITCH S2**DESCRIPTION:**

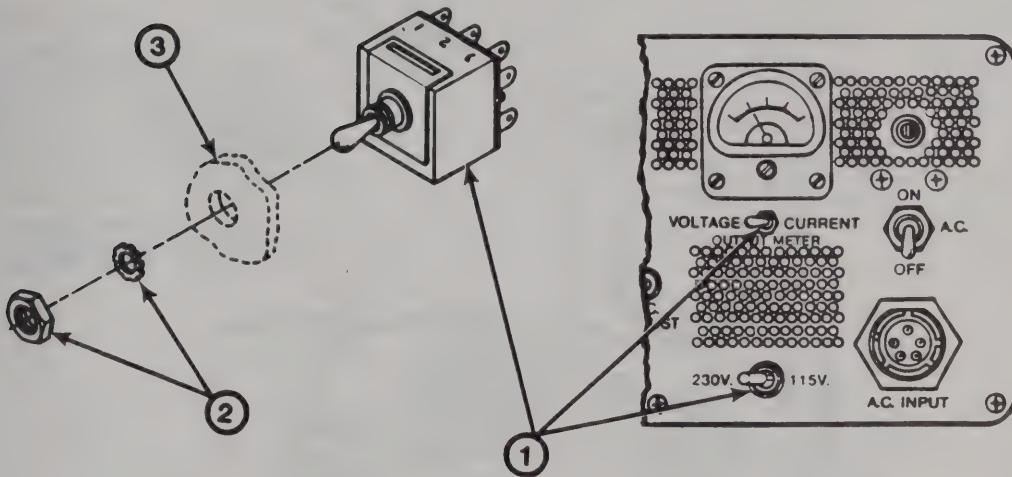
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder and tag all wires to switch (1).
3. Remove hex nut and washer (2) securing switch (1) to front panel (3).
4. Remove switch (1) from front panel (3).



CEONW035

INSTALL

1. Install switch (1) in front panel (3).
2. Install and tighten hex nut and washer (2) securing switch (1) to front panel (3).
3. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables.

END OF TASK

5-27 REPLACE DC ADJUST POTENTIOMETER R2

DESCRIPTION:

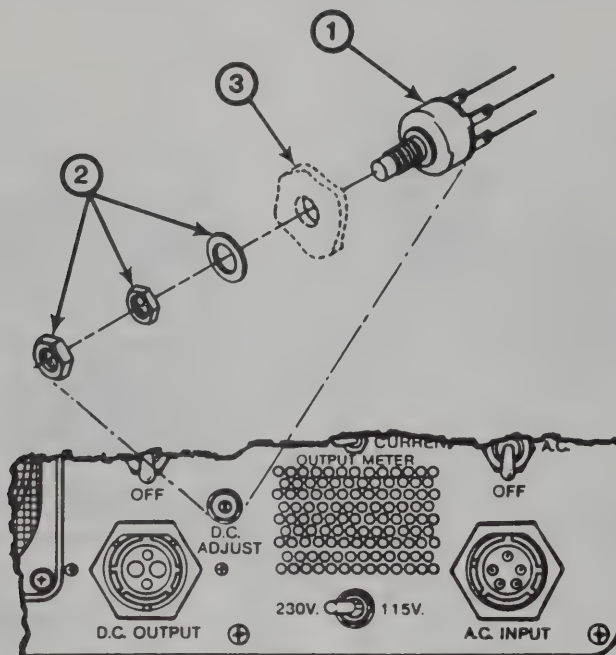
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder and tag all wires to potentiometer R2 (1).
3. Remove locking nut, hex nut and washer (2) securing potentiometer R2 (1) to front panel (3).
4. Remove potentiometer R2 (1) from front panel (3).



INSTALL

CEONW036

1. Install potentiometer R2 (1) in front panel (3).
2. Install and tighten locking nut, hex nut and washer (2) securing potentiometer R2 (1) to front panel (3).
3. Solder all wires to potentiometer R2 (1) as tagged.
4. Align front panel and gasket and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables.

END OF TASK

5-28 REPLACE OUTPUT METER M1

DESCRIPTION:

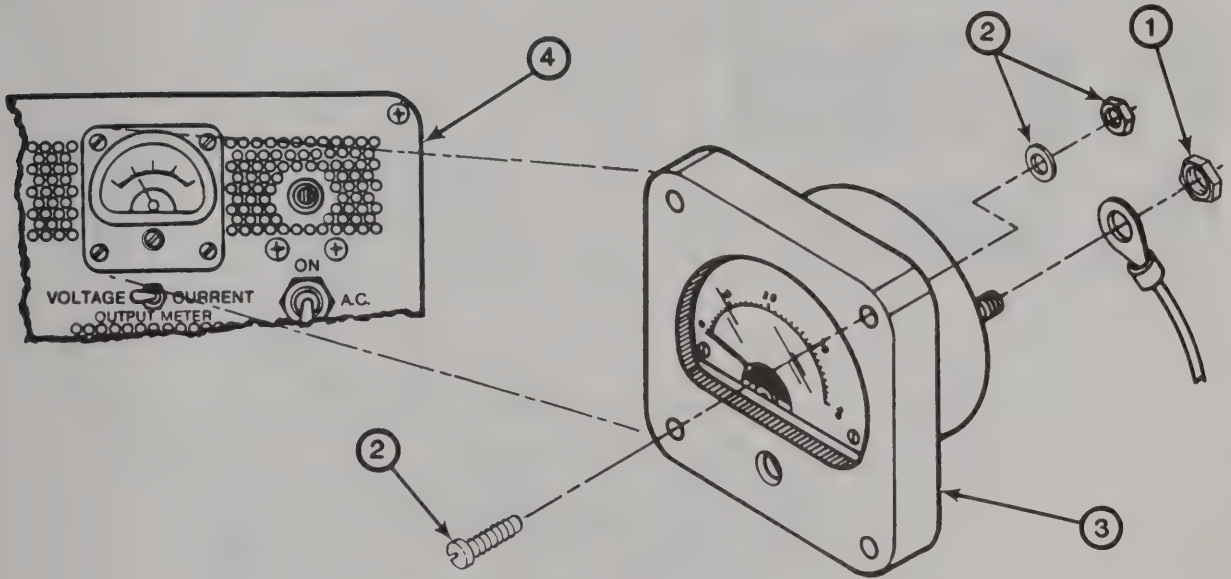
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Remove two hex nuts (1). Remove and tag wires.
3. Remove four screws, hex nuts and washers (2) securing meter M1 (3) to front panel (4).
4. Remove meter M1 (3).



CEONW037

INSTALL

1. Install meter M1 (3) in front panel (4).
2. Install and tighten four screws, hex nuts and washers (2) securing meter M1 (3) to front panel (4).
3. Install wires as tagged. Install and tighten two hex nuts (1) securing wires to meter M1 (3).
4. Align front panel and gasket and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables

END OF TASK

5-29 REPLACE DC CIRCUIT BREAKER CB2 AND AC CIRCUIT BREAKER CB1

DESCRIPTION:

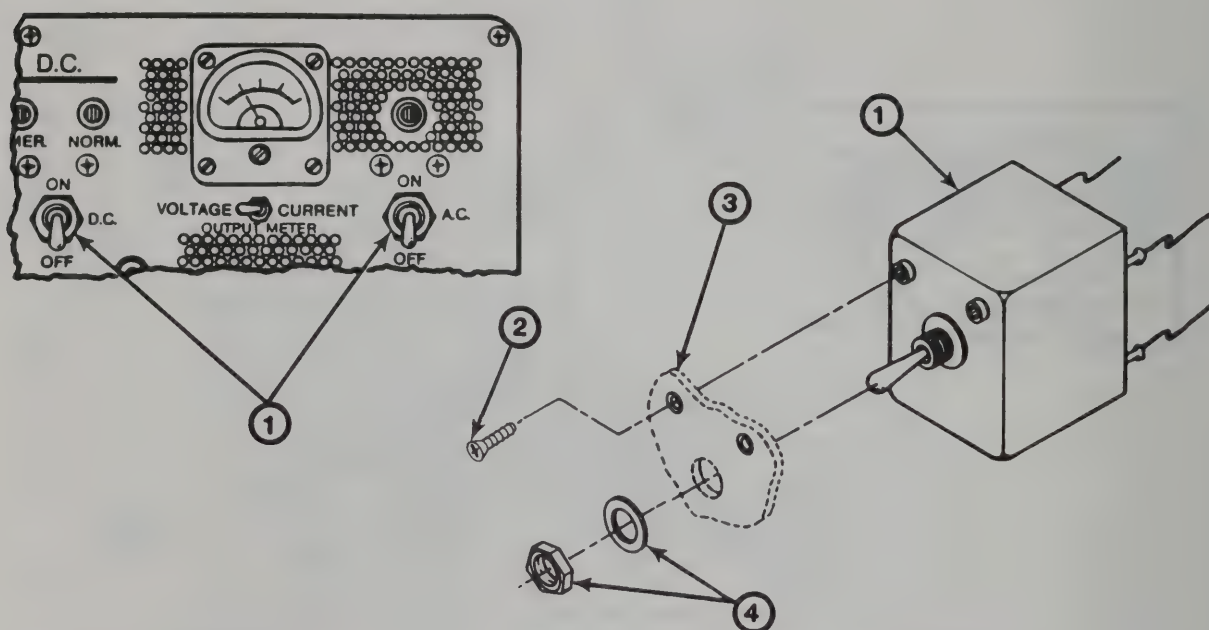
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder and tag all wires to circuit breaker (1).
3. Remove two screws (2) securing circuit breaker (1) to front panel (3).
4. Remove hex nut and washer (4) securing circuit breaker (1) to front panel (3).
5. Remove circuit breaker (1) from front panel (3).



CEONW038

INSTALL

1. Install circuit breaker (1) in front panel.
2. Install and tighten hex nut and washer (4) securing circuit breaker (1).
3. Install and tighten two screws (2) securing circuit breaker (1) to front panel (3).
4. Solder all wires to circuit breaker (1).
5. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
6. Connect all power cables.

END OF TASK

5-30 REPLACE AC INDICATOR DS1, EMER INDICATOR LAMP DS3 AND NORM INDICATOR LAMP DS2

DESCRIPTION:

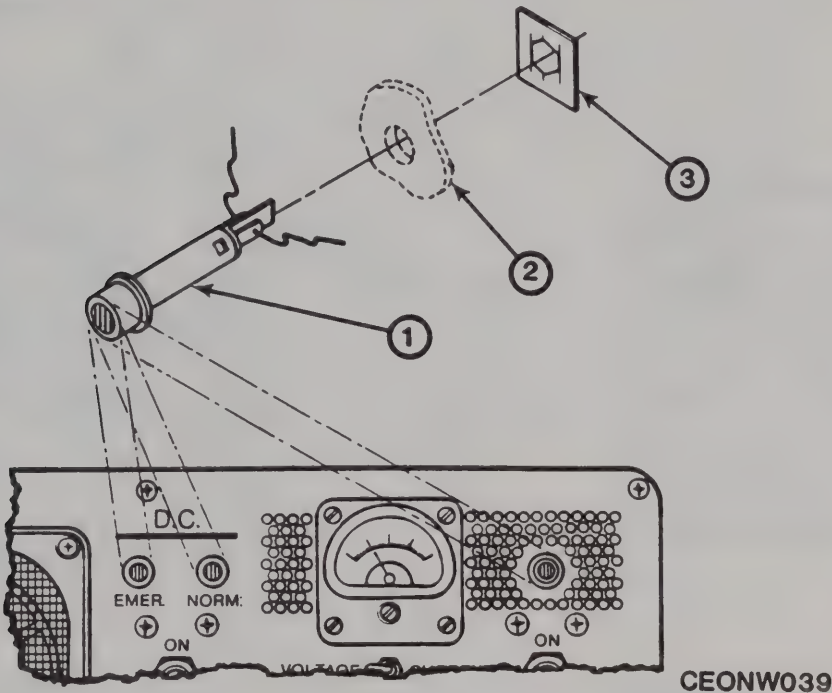
This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE:

Disconnect all power cables.

REMOVE

1. Remove six screws and washers securing front panel to chassis (para 5-11). Lower front panel.
2. Unsolder and tag all wires to indicator (1).
3. Remove spring nut (2) securing indicator (1) to front panel (3).
4. Remove indicator.



INSTALL

1. Install indicator (1) in front panel.
2. Install spring nut (2) securing indicator (1) tightly to front panel (3).
3. Solder all wires on indicator (1) as tagged.
4. Align front panel and gasket, and install and tighten six screws and washers securing front panel to chassis (para 5-11).
5. Connect all power cables.

END OF TASK

5-31 REPLACE SHUNT R1

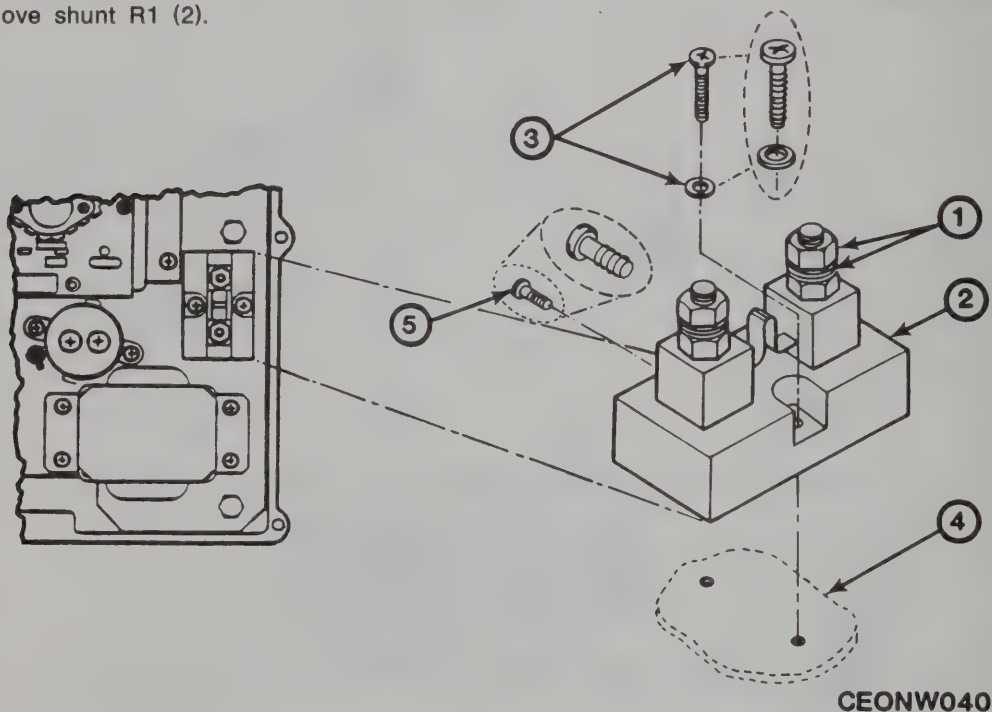
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Remove two hex nuts and lockwashers (1). Remove and tag all wires from shunt R1 (2).
4. Remove two screws and washers (3) securing shunt R1 (2) to base plate(4).
5. Remove shunt R1 (2).



INSTALL

1. Install and align shunt R1 (2) to baseplate (4).
2. Install and tighten two screws (3) and washers (3) securing shunt R1 (2) to base plate (4).
3. Install wires as tagged. Install and tighten two hex nuts and lockwashers.
4. Install control board assembly A3 (para 5-16).
5. Install top cover (para 5-12).
6. Connect all power cables.

END OF TASK

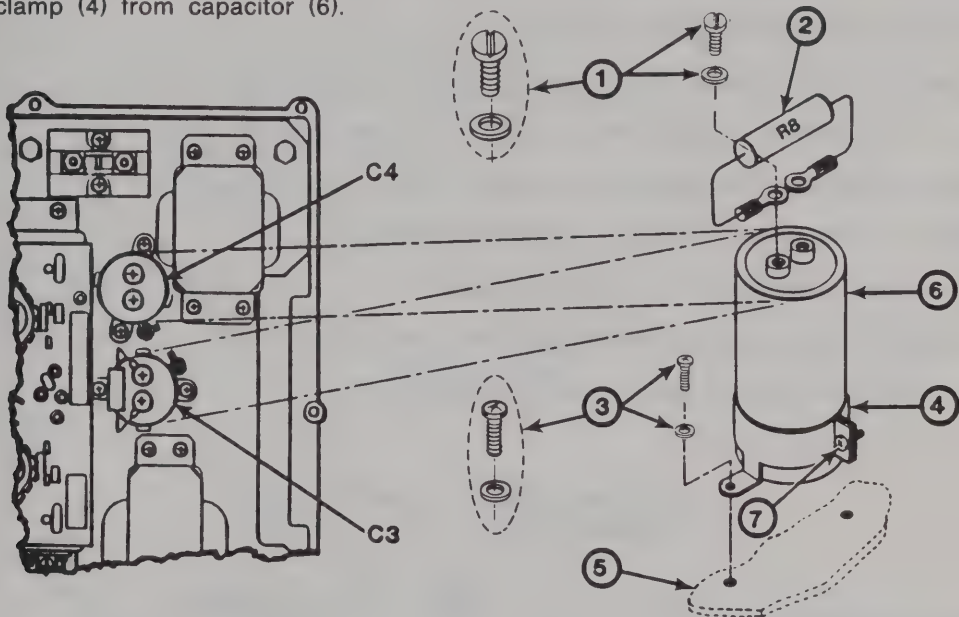
5-32 REPLACE CAPACITORS C3 AND C4 AND RESISTOR R8**DESCRIPTION:**

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Remove two screws and washers (1) securing wires and resistor (2).
4. Remove and tag wires and resistor (2).
5. Remove screws and washers (3) securing clamp (4) to base plate (5).
6. Remove capacitor (6) and remove clamp screw (7).
7. Remove clamp (4) from capacitor (6).

**INSTALL**

CEONW041

1. Install clamp (4) on capacitor (6).
2. Install and tighten clamp screw and install and align capacitor (6) to base plate (5).
3. Install and tighten screws and washers (3) securing capacitor (6) to base plate (5).
4. Install wires and resistor (2) as tagged.
5. Install and tighten two screws and washers (1) securing wires and resistor (2).
6. Install control board assembly A3 (para 5-16).
7. Install top cover (para 5-12).
8. Connect all power cables.

END OF TASK

5-33 REPLACE CAPACITORS C6, C7 AND C8 AND FILTERS FL1, FL4, FL5 AND L2

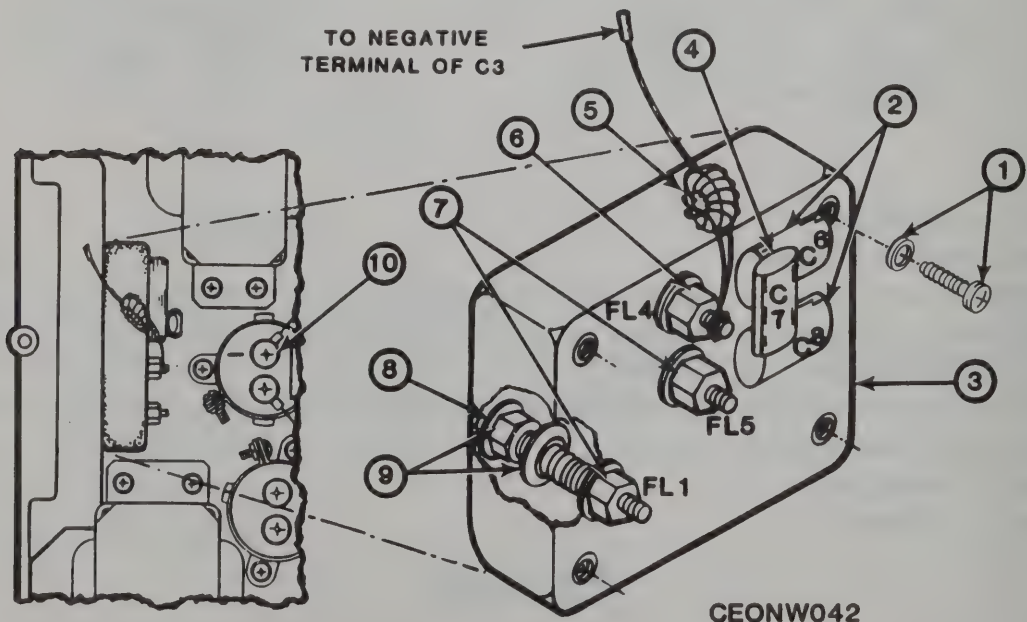
DESCRIPTION:

This procedure covers: Remove. Install.

PRELIMINARY PROCEDURE: Disconnect all power cables.

REMOVE

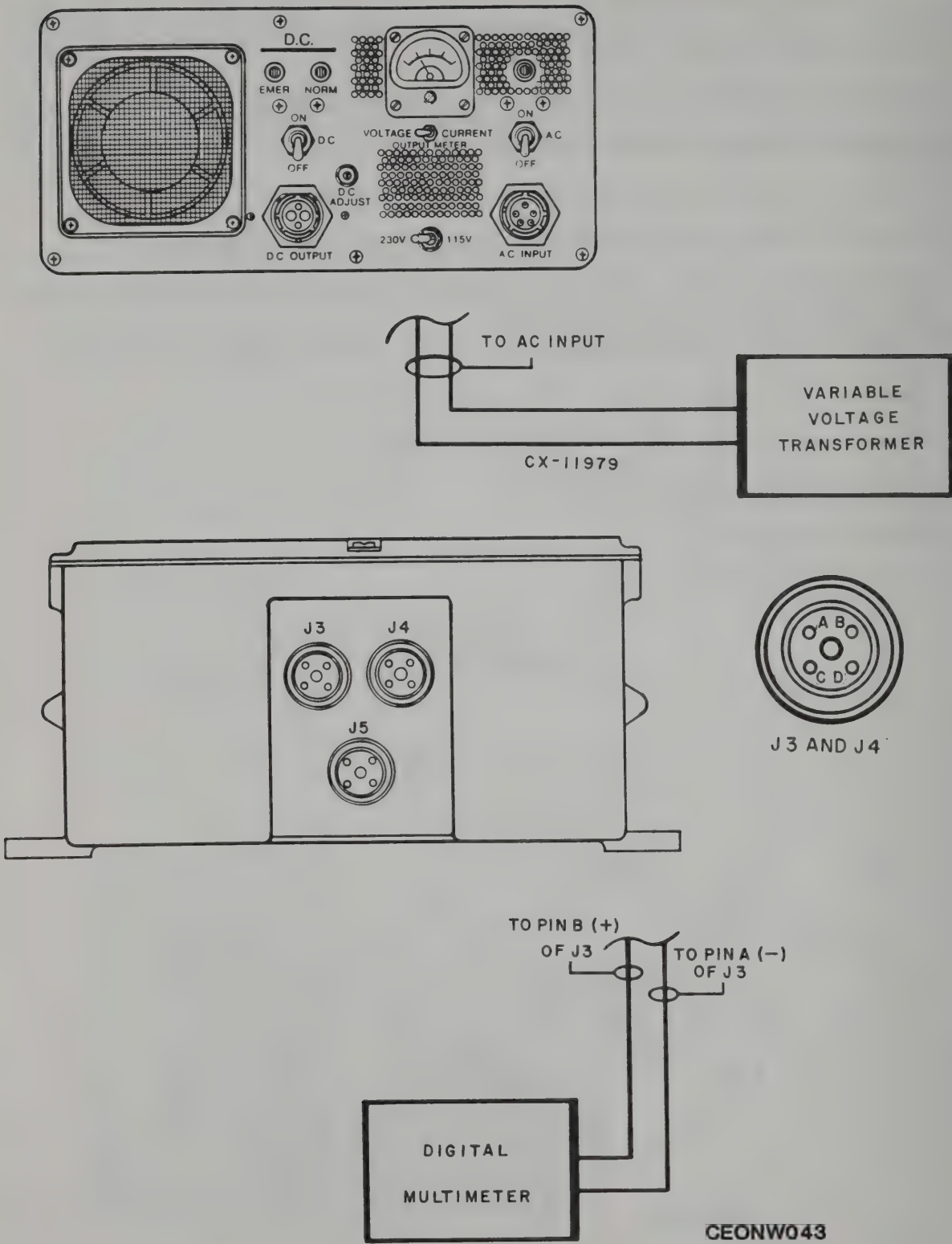
1. Remove top cover (para 5-12).
2. Remove control board assembly A3 (para 5-16).
3. Perform steps 3 thru 6 of para 5-22 Remove.
4. Remove screw and washer (1) securing C6 and C8 (2) to connector assembly (3) (stand-off in connector assembly is not secured).
5. Unsolder and remove capacitor C7 (4).
6. Unsolder and tag all wires from filters FL1, FL5 (7) and FL4 (6).
7. Remove L2 wire from negative terminal of C3 (10) and remove L2 (5).
8. Unsolder and remove capacitors C6 and C8 (2) from filters (6) and (7).
9. Unsolder and tag all wires on rear of filters (6) and (7).
10. Remove plastic washer (8) from filters (6) and (7).
11. Remove hex nut and washer (9) securing filters (6) and (7).
12. Remove filters (6) and (7) from connector assembly (3).



INSTALL

1. Install filters (6) and (7) in connector assembly (3).
2. Install and tighten hex nut and washer (9) securing filters (6) and (7) to connector assembly (3).
3. Install plastic washer (8) to filters (6) and (7).
4. Connect and solder all wires on rear of filters (6) and (7) as tagged.
5. Connect and solder capacitors C6 and C8 (2) to filters FL1, FL5 (7), and FI4 (6).
6. Align terminal lug on capacitors C6 and C8 (2) and wires as tagged to connector assembly (3). Install and tighten screw and washer (1) to stand-off.
7. Install L2 (5) wire on negative terminal of C3 (10) and solder to FL4 (6).
8. Install and solder capacitor C7 (4) to filters FL4 (6) and FL5 (7).
9. Perform steps 2 thru 4 of para 5-22 Installation Procedures.
10. Install control board assembly A3 (para 5-16).
11. Install top cover (para 5-12).
12. Connect all power cables.

END OF TASK



PERFORMANCE TESTS

5-34 OUTPUT RANGE TEST

DESCRIPTION:

This test is to check the range of dc output voltage.

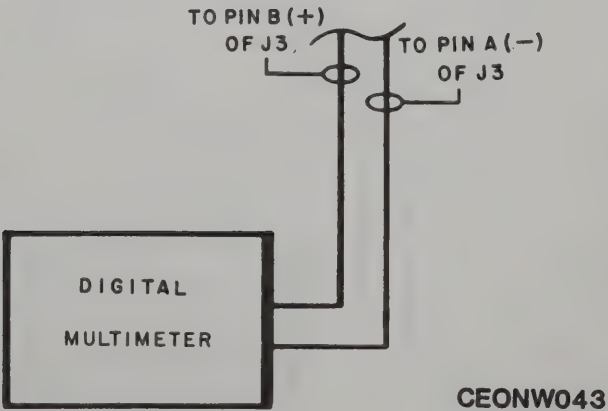
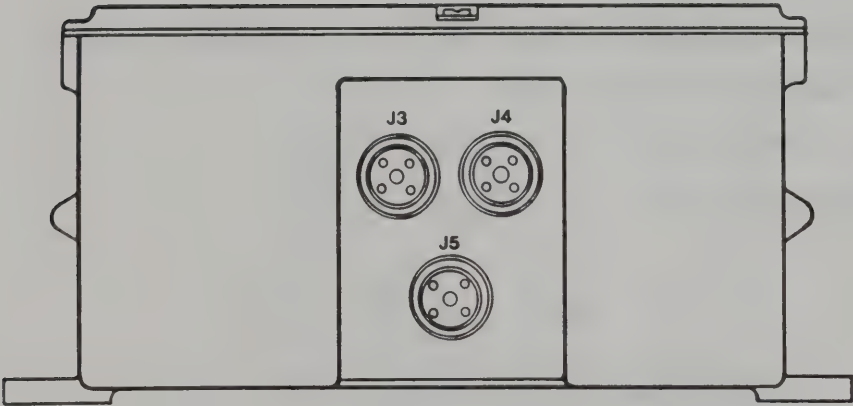
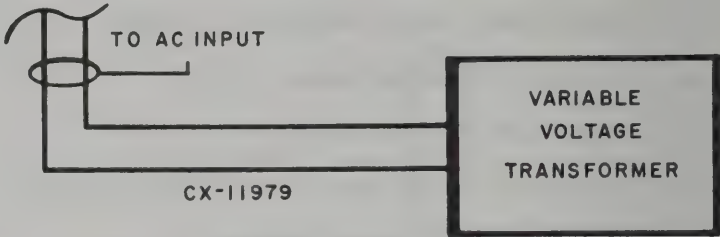
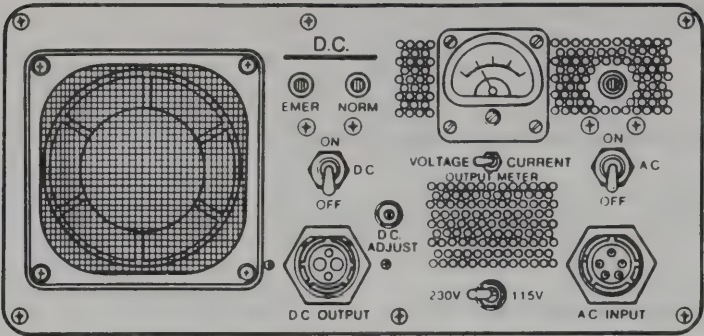
INITIAL SETUP:

Set up equipment as shown on facing page.

1. Set 230 V/115 V switch S1 to the 115 V position.
2. Adjust variable voltage transformer to provide 115 vac.
3. Set AC ON/OFF circuit breaker to ON.
4. Set DC ON/OFF circuit breaker to ON.
5. Turn the DC ADJUST potentiometer R2 of the Power Supply fully counterclockwise.
6. Measure output voltage at connector J3.
 - Dc output should be 24 vdc or less.
7. Turn the DC ADJUST potentiometer R2 fully clockwise.
8. Measure output voltage at connector J3.
 - Dc output should be 32 vdc or more.

NOTE

An approximate indication of the output voltage can also be made with the Power Supply output meter M1, with meter select switch S2 in the VOLTAGE position.



5-35 REGULATION TEST

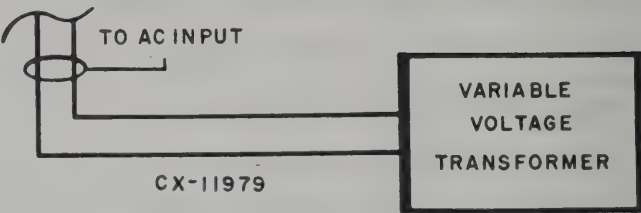
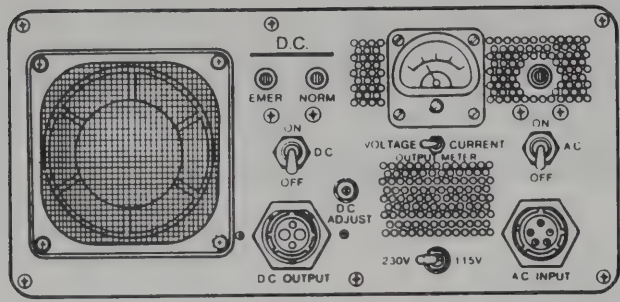
DESCRIPTION:

This test is to check the regulation capability of the Power Supply.

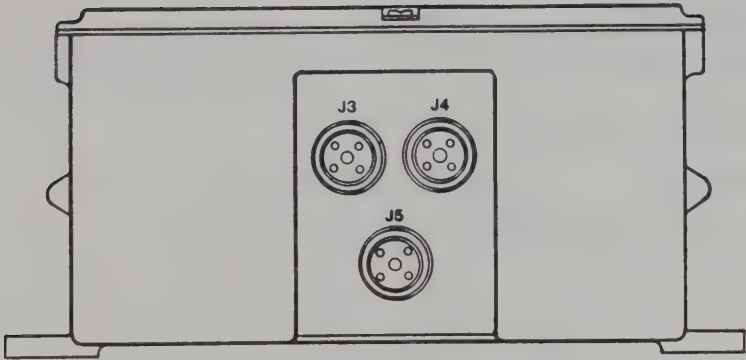
INITIAL SETUP: Fabricate battery charging cables as shown in Appendix F.
Set up equipment as shown on facing page.

LINE

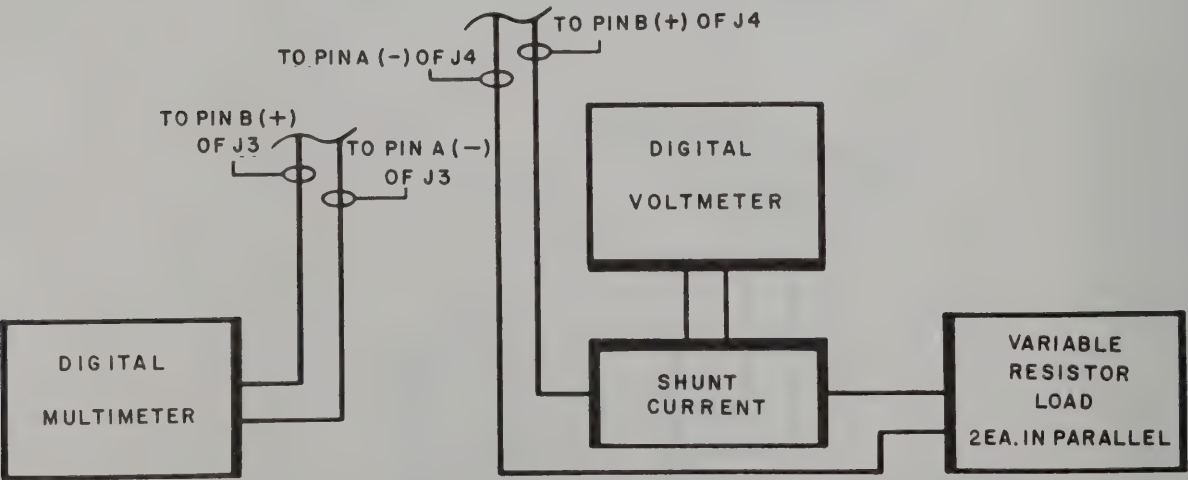
1. Set 230 V/115 V switch S1 to the 115 V position.
2. Adjust variable voltage transformer to provide 115 vac.
3. Set AC ON/OFF circuit breaker to ON.
4. Set DC ON/OFF circuit breaker to ON.
5. Turn the DC ADJUST potentiometer R2 for a 28.00 vdc output at connector J3.
6. Adjust variable voltage transformer to provide 125 vac.
7. Measure output voltage at connector J3.
 - Dc output should be between 27.72 and 28.28 vdc.
8. Adjust variable voltage transformer to provide 105 vac.
9. Measure output voltage at connector J3.
 - Dc output should be between 27.72 and 28.28 vdc.



CX-11979



J3 AND J4



CEONW044

5-35 REGULATION TEST (CONT'D)

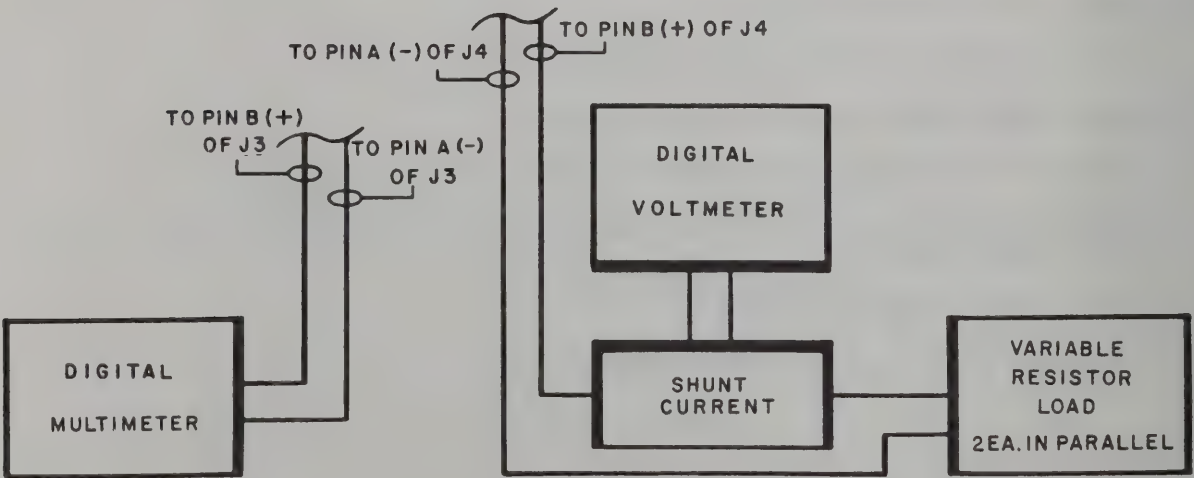
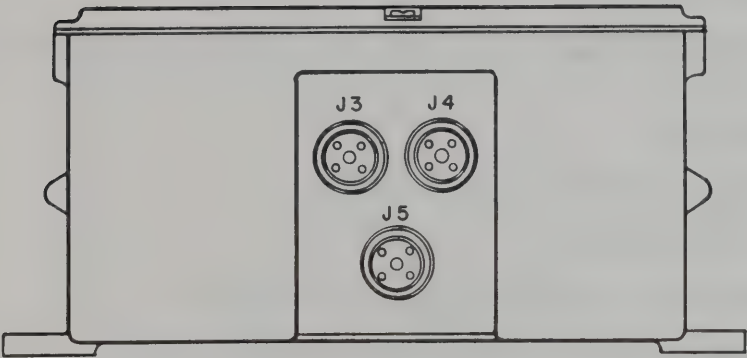
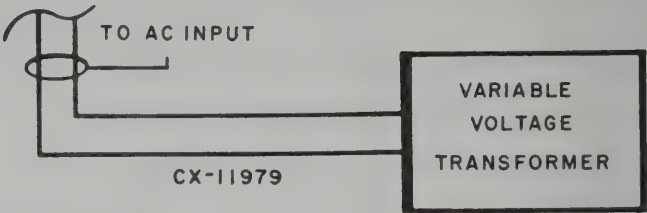
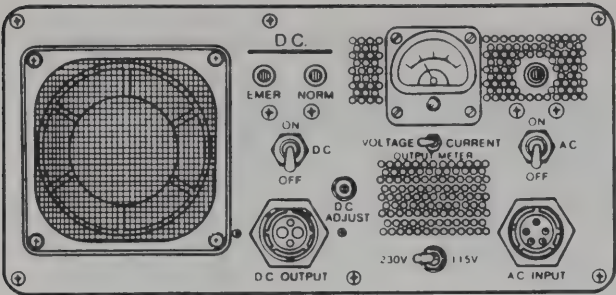
DESCRIPTION:

This test is to check the regulation capability of the Power Supply.

INITIAL SETUP: Fabricate battery charging cables as shown in Appendix F.
Set up equipment as shown on facing page.

LOAD

1. Set 230 V/115 V switch S1 to the 115 V position.
2. Adjust variable voltage transformer to provide 115 vac.
3. Adjust variable resistor load for no load.
4. Set AC ON/OFF circuit breaker to ON.
5. Set DC ON/OFF circuit breaker to ON.
6. Turn the DC ADJUST potentiometer R2 for a 28.00 vdc output at connector J3.
7. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
8. Measure output voltage at connector J3.
 - Dc output should be between 27.72 and 28.28 vdc.
9. Return variable resistor to the no load position.
10. Turn the DC ADJUST potentiometer R2 for a 24.00 vdc output at connector J3.
11. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
12. Measure output voltage at connector J3.
 - Dc output should be between 23.76 and 24.24 vdc.
13. Return variable resistor load to the no load position.
14. Turn the DC ADJUST potentiometer R2 for a 32.00 vdc output at connector J3.
15. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
16. Measure output voltage at connector J3.
 - Dc output should be between 31.68 and 32.32 vdc.



CEONW044

5-36 OVER-CURRENT PROTECTION TEST

DESCRIPTION:

This test is to check the over-current protection limits of the Power Supply.

INITIAL SETUP: Fabricate battery charging cables as shown in Appendix F.

Set up equipment as shown on facing page.

1. Set 230 V/115 V switch S1 to the 115 V position.
2. Adjust variable voltage transformer to provide 115 vac.
3. Adjust variable resistor load for no load.
4. Set AC ON/OFF circuit breaker to ON.
5. Set DC ON/OFF circuit breaker to ON.
6. Turn the DC ADJUST potentiometer R2 to obtain a 28.00 vdc output at connector J3.
7. Slowly increase the variable resistor load until a current limit point is observed on the digital voltmeter.

NOTE

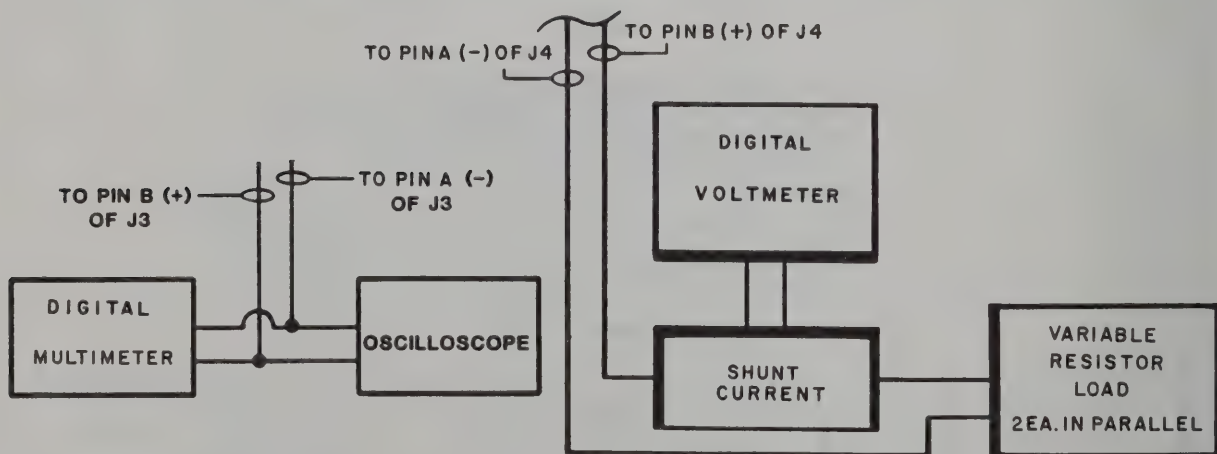
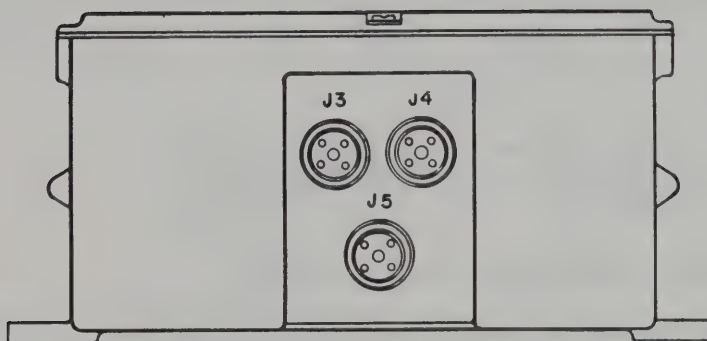
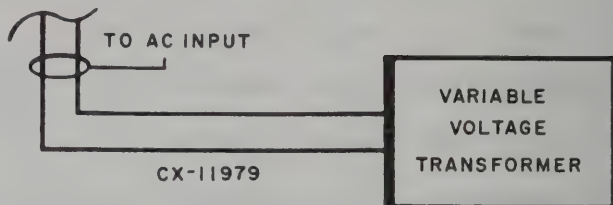
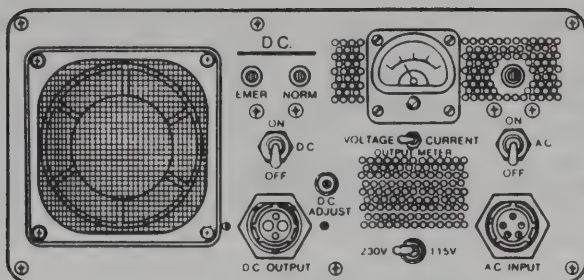
Dc output voltage will drop with increasing load once the current limit point is reached).

- Output current should be the equivalent of 26 to 30 amps.

8. Decrease the variable resistor load until the output voltage at connector J3 recovers to the 28.00 vdc and the current is the equivalent of 25 amps as observed on the digital voltmeter.

NOTE

The current limit point can be adjusted slightly higher or lower by following the procedure indicated in paragraph 5-40 (Adjustment of control board A3 current limit point).



CEONW045

5-37 RIPPLE TEST

DESCRIPTION:

This test is to check the ripple limits of the Power Supply.

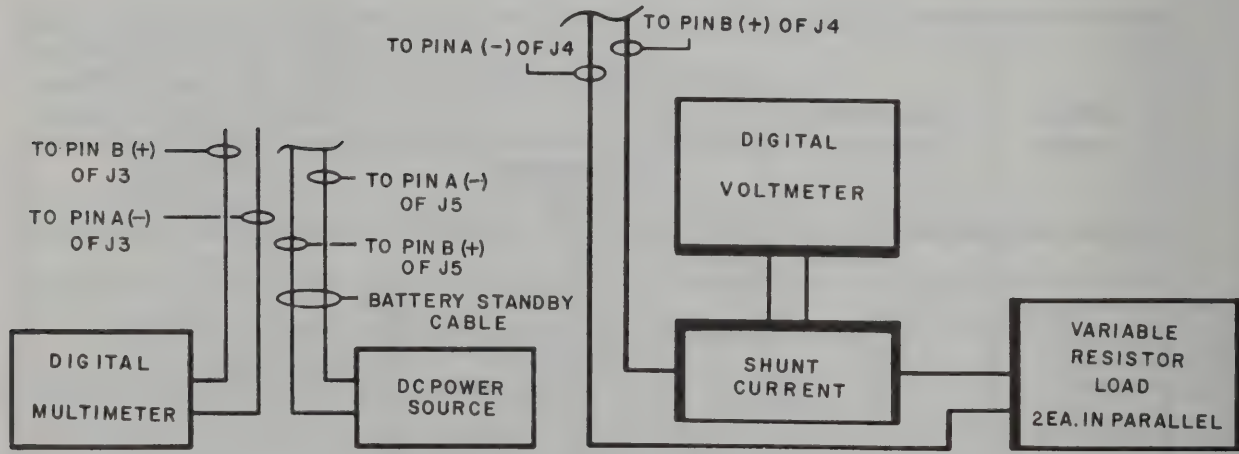
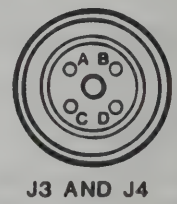
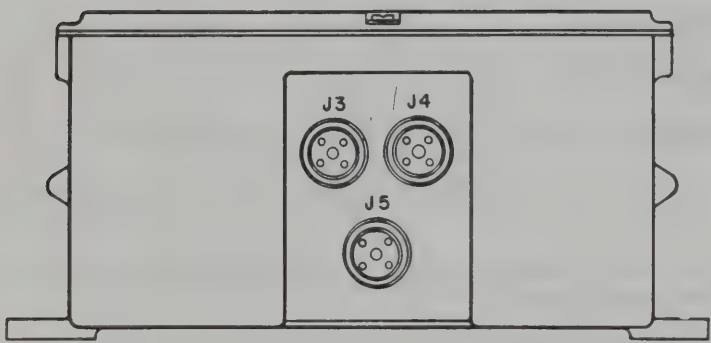
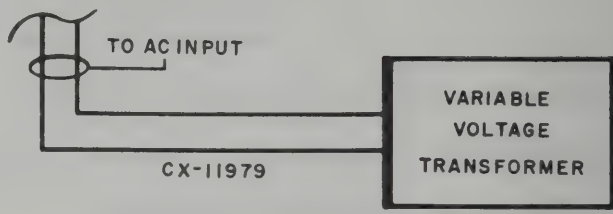
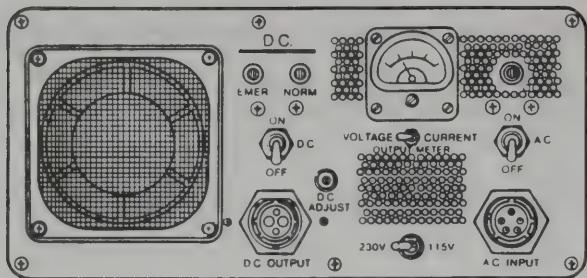
INITIAL SETUP: Fabricate battery charging cables as shown in Appendix F.
Set up equipment as shown on facing page.

NOTE

Scope connection at the dc output of the Power Supply should be as short as possible to avoid stray noise pick up.

- 1. Set 230 V/115 V switch S1 to the 115 V position.
- 2. Adjust variable voltage transformer to provide 115 vac.
- 3. Adjust variable resistor load for no load.
- 4. Set AC ON/OFF circuit breaker to ON.
- 5. Set DC ON/OFF circuit breaker to ON.
- 6. Turn the DC ADJUST potentiometer R2 for a 28.00 vdc output at connector J3.
- 7. Set the digital multimeter to ac milli-volt scale. This multimeter will be used to measure the rms ripple voltage.
- 8. Adjust the input voltage with the variable voltage transformer and the load current with the variable resistor load for each condition shown below.
- 9. Ripple should be within the limits shown below.

LOAD AMPS	AC INPUT VOLTS	RMS RIPPLE VOLTAGE	PEAK TO PEAK RIPPLE VOLTAGE SWITCHING, SPIKES, NOISE (Vpp)
		SPECIFIED MAX	SPECIFIED MAX
0	105	.14	.28
25	105	.14	.28
0	115	.14	.28
25	115	.14	.28
0	125	.14	.28
25	125	.14	.28



CEONW046

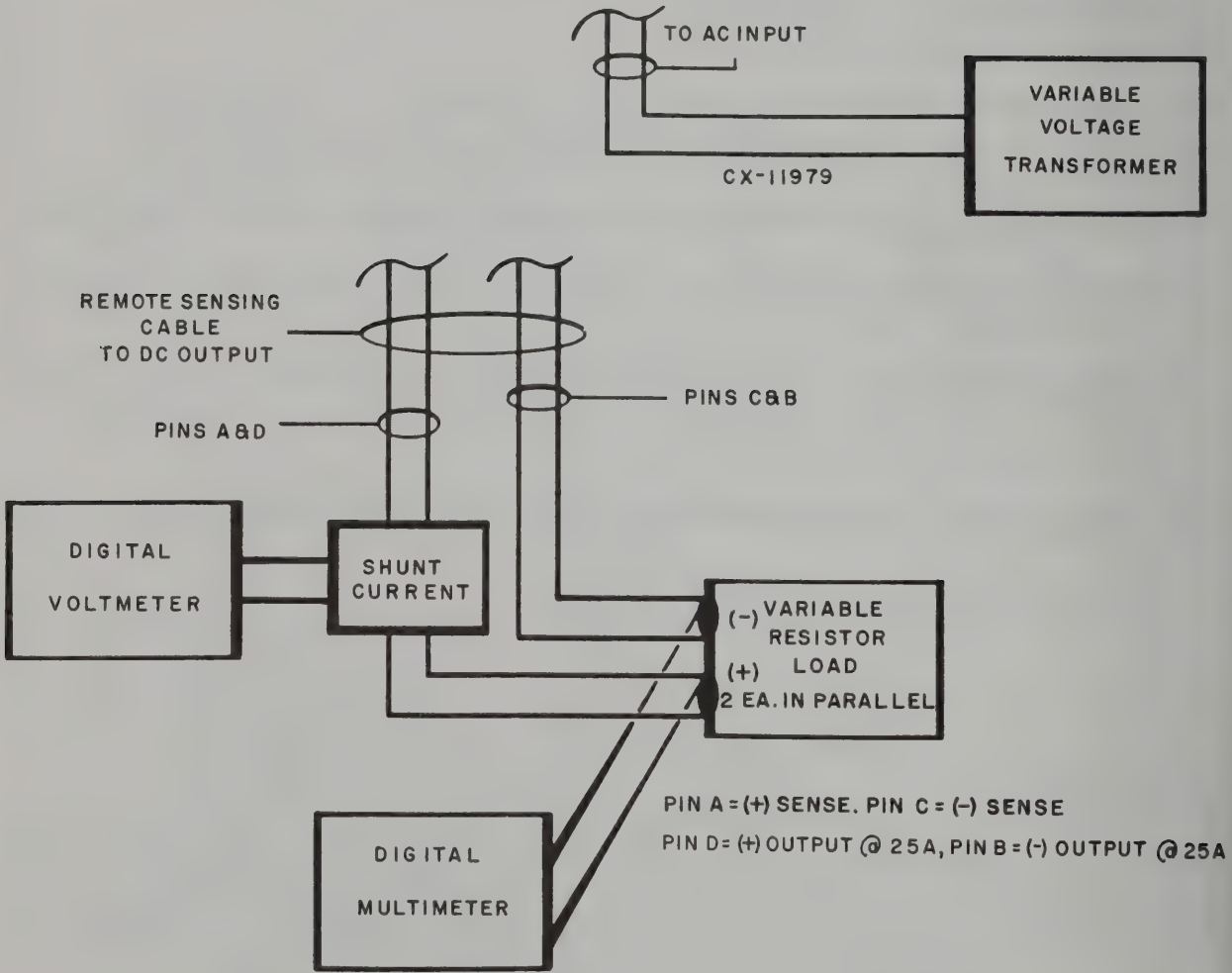
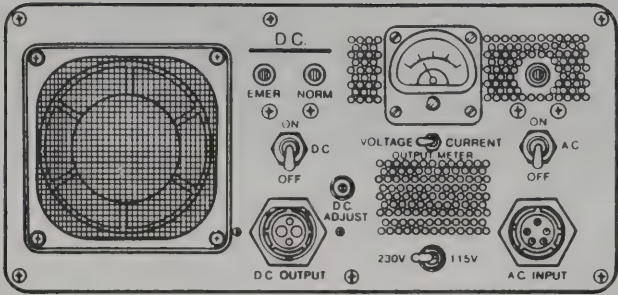
5-38 POWER TRANSFER TEST

DESCRIPTION:

This test checks the capability of the Power Supply to obtain power from an external source when ac input power fails.

INITIAL SETUP: Fabricate battery standby and battery charging cables as shown in Appendix F.
Set up equipment as shown on facing page.

1. Check for proper polarity at dc power source.
2. Set 230 V/115 V switch S1 to the 115 V position.
3. Adjust variable voltage transformer to provide 115 vac.
4. Adjust variable resistor load for no load.
5. Set AC ON/OFF circuit breaker to ON.
6. Set DC ON/OFF circuit breaker to ON.
7. Turn the DC ADJUST potentiometer R2 for a 28.00 vdc output at connector J3.
8. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
9. With 115 vac input to the Power Supply, the green DC NORM indicator should be on and the red DC EMER indicator should be out.
 - Input voltage should be between 77 and 89 vac.
10. Slowly lower the ac input to the Power Supply until the green DC NORM indicator is out and the red DC EMER indicator is on.
 - Input voltage should be between 77 and 89 vac.
11. Slowly raise the ac input to the Power Supply until the red DC EMER indicator is out and the green DC NORM indicator is on.
 - Input voltage should be between 91 and 103 vac.



CEONW047

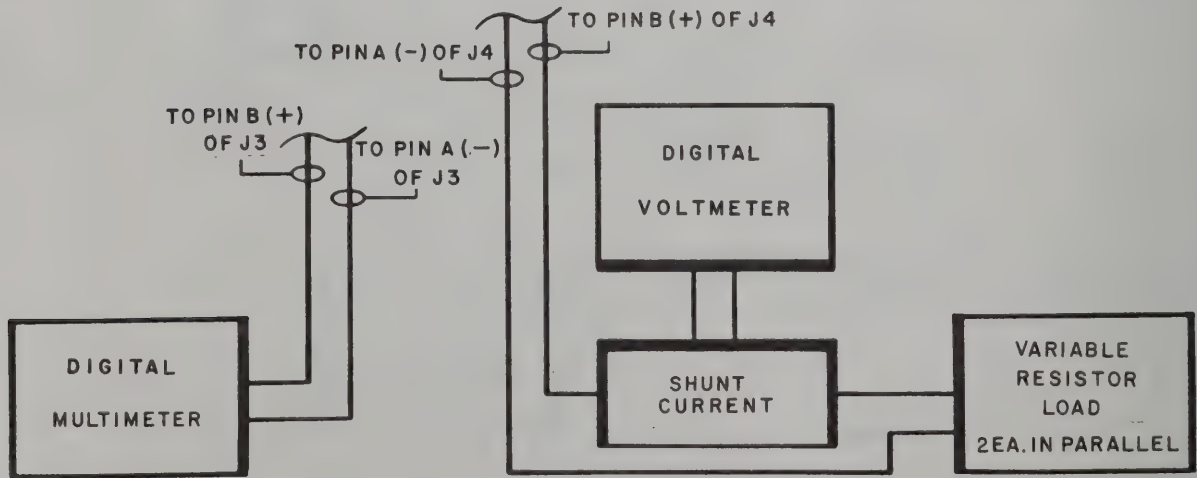
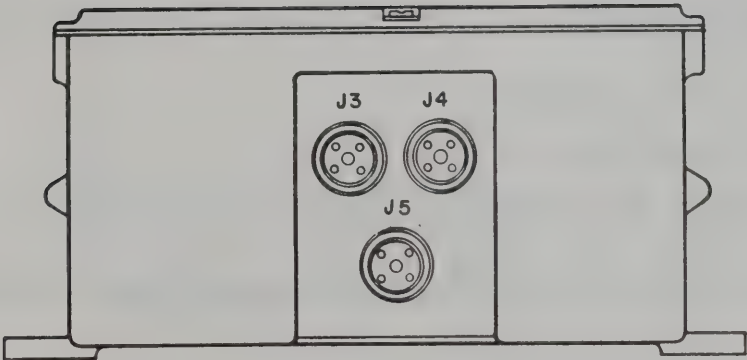
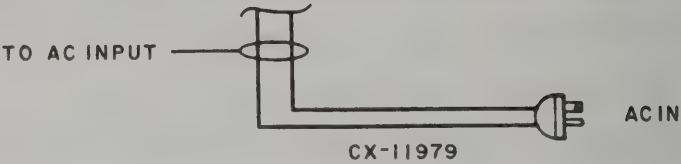
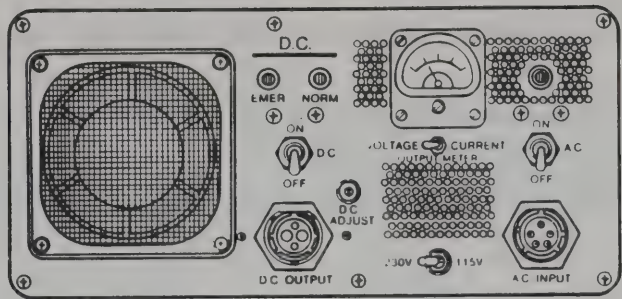
5-39 REMOTE SENSING TEST

DESCRIPTION:

This test checks the operation of the Power Supply remote sensing circuitry.

INITIAL SETUP: Fabricate remote sensing cables as shown in Appendix F.
Set up equipment as shown on facing page.

1. Set 230 V/115 V switch S1 to the 115 V position.
2. Adjust variable voltage transformer to provide 115 vac.
3. Adjust variable resistor load for no load.
4. Set AC ON/OFF circuit breaker to ON.
5. Set DC ON/OFF circuit breaker to ON.
6. Turn the DC ADJUST potentiometer R2 for a 29.00 vdc output as measured at the variable resistor load.
7. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
 - Dc output should be between 28.71 and 29.29 vdc.
8. Return variable resistor to the no load position.
9. Turn the DC ADJUST potentiometer R2 for a 24.00 vdc output as measured at the variable resistor load.
10. Slowly increase the variable resistor load until an output load current the equivalent of 25 amps is observed on the digital voltmeter.
 - Dc output should be between 23.76 and 24.24 vdc.



CEONW048

ADJUSTMENTS

5-40 ADJUSTMENT OF CONTROL BOARD A3 CURRENT LIMITING ACTION A3R11

DESCRIPTION:

This adjustment will increase or decrease the current limiting action of the Power Supply and verify its proper operation.

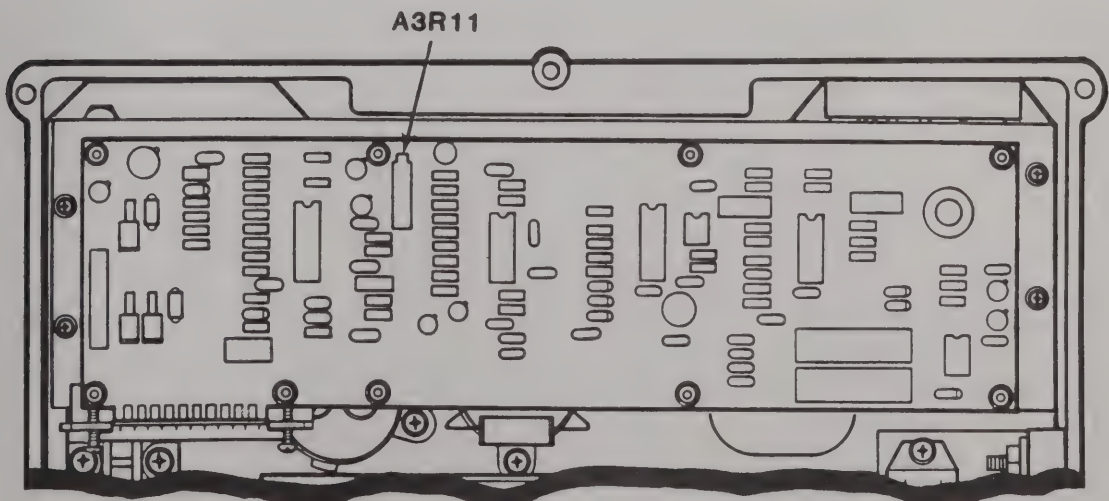
INITIAL SETUP: Fabricate battery charging cables as shown in Appendix F.
Set up equipment as shown on facing page.

1. Set 230 V/115 V switch S1 to the 115 V position.
2. Set AC ON/OFF circuit breaker to ON.
3. Set DC ON/OFF circuit breaker to ON.
4. Adjust variable resistor load for "0" current reading on the digital voltmeter.
5. Turn the DC ADJUST potentiometer R2 for a 28.00 vdc output at connector J3.
6. Set DC ON/OFF circuit breaker to OFF.
7. Adjust variable resistor load to 1.5 Ω or higher.
8. Set DC ON/OFF circuit breaker to ON.
9. Slowly decrease the value of the variable resistor load until you reach a current limit point between 26 and 30 amps dc. This is indicated when the digital voltmeter reading ceases to increase.

WARNING

*High voltage can cause
burns and electrical shock.
See general warning page.*

10. If the unit does not limit current within 26 to 30 amps dc range, do not exceed 30 amps. Remove top cover (para 5-12). Adjust A3R11 for a reading between 26 and 30 amps.
11. If adjustment of R11 does not affect the current limit point, replace control board A3 (para 5-16).



SECTION VI. PREPARATION FOR STORAGE OR SHIPMENT

5-41 GENERAL

Refer to Chapter 3, Section V for preparation for storage or shipment information.

APPENDIX A

REFERENCES

A-1 SCOPE

This appendix lists all forms, technical bulletins, technical manuals, and miscellaneous publications referenced in this manual.

A-2 FORMS

Recommended Changes to Publications and Blank Forms	DA Form 2028
Recommended Changes to Equipment Technical Manuals	DA Form 2028-2
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Report of Discrepancy	Form SF 364
Quality Deficiency Report	Form SF 368
Commercial Packaging of Supplies and Equipment	MIL-STD-1188A

A-3 TECHNICAL MANUALS

The Army Maintenance Management System (TAMMS)	DA Pam 738-750
Administrative Storage Procedures	TM 740-90-1
Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)	TM 750-244-2
Organizational, Direct Support, and General Support Repair Parts and Special Tools List for Power Supply PP-6224B/U	TM 11-6130-458-24P

A-4. MISCELLANEOUS.

Common Table of Allowances	CTA 50-970
Consolidated Index of Army Publications and Blank Forms	DA Pam 25-30
First Aid for Soldiers	FM 21-11
Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents	MIL-STD-12

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I. INTRODUCTION

B-1 GENERAL

This section provides a summary of the maintenance operations for the Power Supply PP-6224B/U. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2 MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

- a. *Inspect.*** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.
- b. *Test.*** To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. *Service.*** Operations required periodically to keep an item in proper operating condition; i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.
- d. *Adjust.*** To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.
- e. *Aline.*** To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. *Calibrate.*** To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. *Install.*** The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of the equipment or system.
- h. *Replace.*** The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.
- i. *Repair.*** The application of maintenance services (inspect, test, service, adjust, aline, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.
- j. *Overhaul.*** That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

B-3 COLUMN ENTRIES (SECTION II)

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for the purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

- C Operator/Crew
- O Organizational
- F Direct Support
- H General Support
- D Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in Section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4 TOOL AND TEST EQUIPMENT REQUIREMENTS (SECTION III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for Manufacturers (5-digit) in parentheses.

B-5 REMARKS (SECTION IV)

a. Reference Code. This code refers to the appropriate item in Section II, Column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in Section II.

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
POWER SUPPLY PP-6224B/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	POWER SUPPLY	INSPECT	0.1						A
		TEST		0.1				1, 2	B
		REPAIR		0.1				1, 2	C
		TEST				1.0		3 THRU 11	D
		ADJUST				0.3		3 THRU 11	
		REPAIR				1.3		3 THRU 11	E

SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

FOR

POWER SUPPLY PP-6224B/U

TOOL OR TEST EQUIPMENT REF CODE	MAIN- TENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT	5180-00-064-5178	TK-101/G
2	O	MULTIMETER DIGITAL	6625-01-139-2512	AN/PSM-45
3	H	TOOL KIT, ELECTRONIC EQUIPMENT	5180-01-023-4982	JTK-17AL
4	H	MAINFRAME, POWER	6695-01-074-7953	TEK TM515
5	H	MULTIMETER, DIGITAL	6625-01-075-8583	TEK DM501A
6	H	OSCILLOSCOPE	6695-01-074-7954	TEK SC504
7	H	VARIABLE POWER TRANSFORMER	6120-00-168-3705	W10MT3A53
8	H	RHEOSTAT (VARIABLE RESISTOR LOAD) 2 EA	5905-00-777-9520	BDE411K160CS
9	H	DC POWER SOURCE (OR EQUIVALENT)	4931-00-962-2133	NJEC536CR30
10	H	SHUNT, CURRENT	6625-00-917-9034	GUF9711
11	H	VOLTMETER, DIGITAL	6625-00-537-8305	HP 3490A
		***** MAKE ITEMS *****		
12	O,H	REMOTE SENSING CABLE		
13	O,H	BATTERY STANDBY CABLE		
14	O,H	BATTERY CHARGER CABLE		
		NOTE: MAKE ITEMS ARE TO BE FABRICATED LOCALLY		

SECTION IV. REMARKS
FOR
POWER SUPPLY PP-6224B/U

REFERENCE CODE	REMARKS
A	VISUAL INSPECTION
B	PERFORM OPERATIONAL TEST
C	LIMITED TO REPLACING CABLE ASSEMBLIES, FRONT COVER, AND FAN FILTER
D	PERFORM PERFORMANCE TEST
E	PRINTED CIRCUIT BOARD ASSEMBLIES A1 AND A3, AND ASSEMBLIES A2, A4, AND A5 ARE REPAIRED BY REPLACEMENT.

APPENDIX C

COMPONENTS OF END ITEMS AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

C-1 SCOPE

This appendix lists components of end item and basic issue items for the Power Supply PP-6224B/U to help you inventory the items required for safe and efficient operation.

C-2 GENERAL

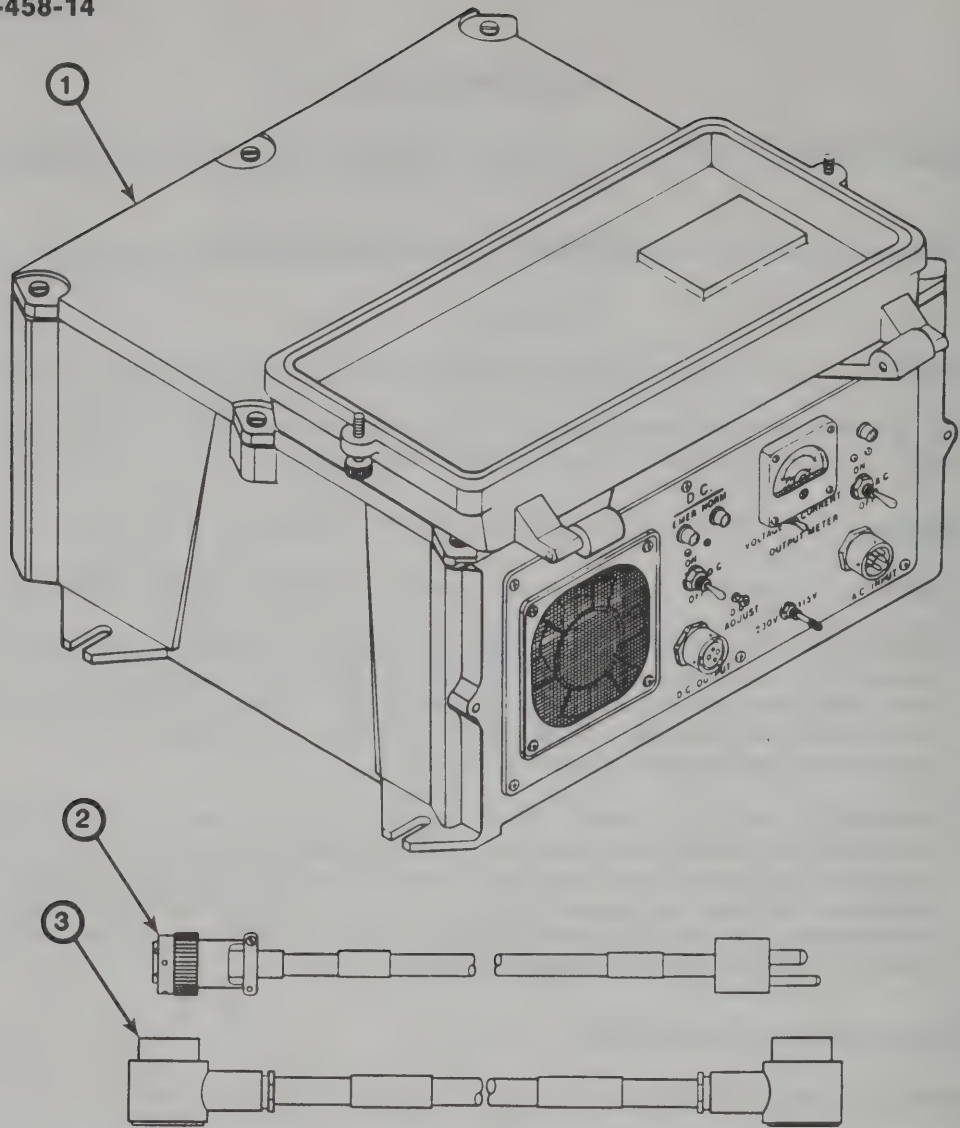
The Components of End Item and Basic Issue Items lists are divided into the following sections:

- a. Section II. Components of End Item.** This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.
- b. Section III. Basic Issue Items.** These are the minimum essential items required to place the PP-6224B/U in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, Basic Issue Items must be with the PP-6224B/U during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard to identify items. This manual is your authority to request/requisition replacement Basic Issue Items, based on TOE/NTOE authorizations of the end item.

C-3 EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

- a. Column (1) — Illustration Number (Illus Number).** This column indicates the number of the illustration in which the item is shown.
- b. Column (2) — National Stock Number.** Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.
- c. Column (3) — Description.** Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.
- d. Column (4) — Unit of Measure (U/M).** Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).
- e. Column (5) — Quantity Required (Qty Req'd).** Indicates the quantity of the item authorized to be used with/on the equipment.



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(1) Illus No.	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Req'd
1	6150-00-466-0127	Power Supply (6224) (52512)	ea	1
2		Cable Assembly, Special Purpose, Electrical CX-11979	ea	1
3		Cable Assembly, Special Purpose, Electrical CX-12342	ea	1

APPENDIX E**EXPENDABLE SUPPLIES AND MATERIALS LIST****SECTION I. INTRODUCTION****E-1 Scope**

This appendix lists expendable supplies and materials you will need to operate and maintain the Power Supply PP-6224B/U. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair parts, and Heraldic Items).

E-2 Explanation of Columns

- a. Column (1) — Item Number.** This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 1, App. E").
- b. Column (2) — Level.** This column identifies the lowest level of maintenance that requires the listed item. (Enter as applicable).
 - C — Operator/Crew
 - O — Organizational Maintenance
 - F — Direct Support Maintenance
 - H — General Support Maintenance
- c. Column (3) — National Stock Number.** This is the National stock number assigned the item; use it to request or requisition the item.
- d. Column (4) — Description.** Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.
- e. Column (5) — Unit of Measure (U/M).** Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C,O	8305-00-222-2423	Cloth, Lint Free (81349) MIL-C-13194	yd
2	C,O		Brush	ea
3	C,O	7930-00-531-9716	Detergent, Mild, Liquid	oz

APPENDIX F

ILLUSTRATED LIST OF MANUFACTURED ITEMS

SECTION I. INTRODUCTION

F-1 ORGANIZATIONAL AND SCOPE

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at organizational and general support maintenance level for the Power Supply PP-6224B/U.

All bulk materials needed for manufacture of an item are listed by part number.

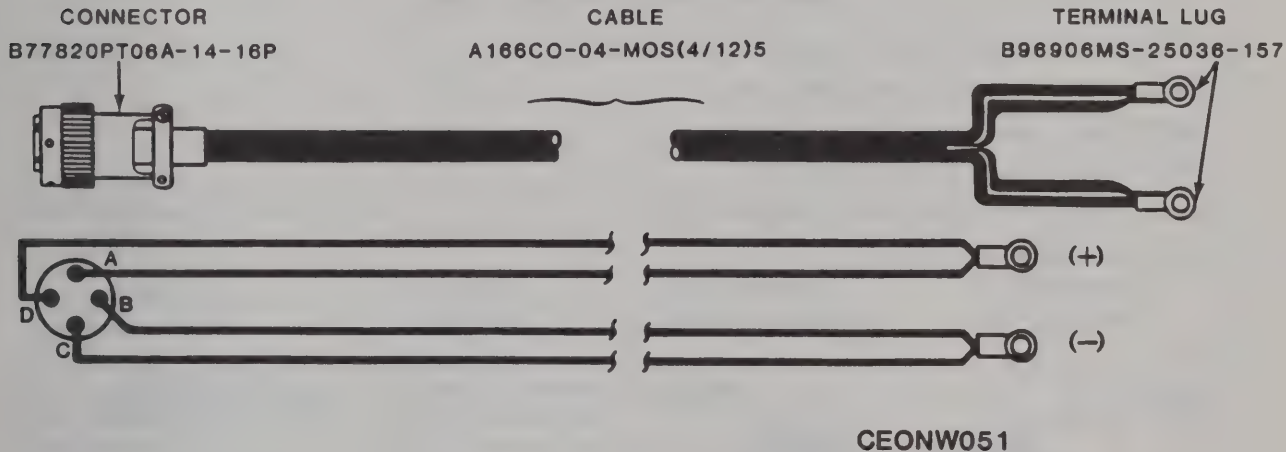


Figure F-1. Remote Sensing Cable

1. Cut cable to desired length (not to exceed 25 feet)
2. Solder black wire to pin A of connector.
3. Solder green wire to pin D of connector.
4. Solder red wire to pin B of connector.
5. Solder white wire to pin C of connector.
6. Solder black and green wires to terminal lug.
7. Solder red and white wire to terminal lug.

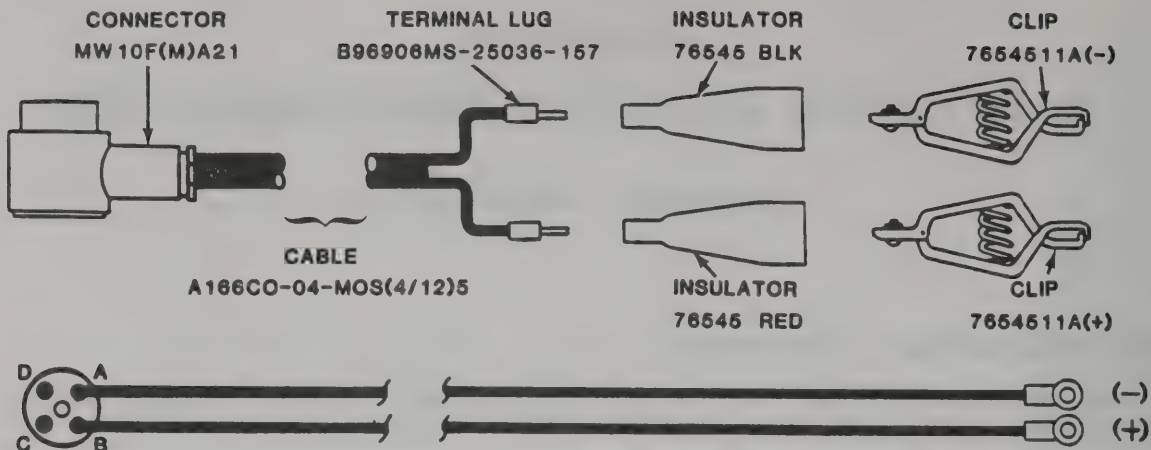


Figure F-2. Battery Standby Cable

CEONW052

1. Cut cable to desired length (not to exceed 10 feet).
2. Strip and cut off white and green wires.
3. Solder black wire to pin A of connector.
4. Solder red wire to pin B of connector.
5. Solder black and red wires to terminal lugs.
6. Install insulators and clips.

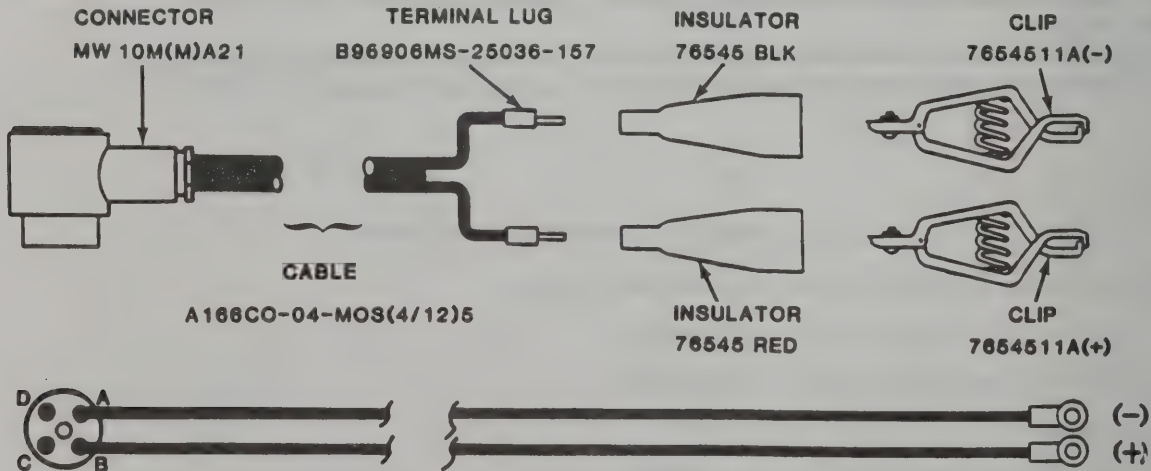


Figure F-3. Battery Charging Cable

CEONW053

1. Cut cable to desired length (not to exceed 10 feet).
2. Strip and cut off white and green wires.
3. Solder black wire to pin A of connector.
4. Solder red wire to pin B of connector.
5. Solder black and red wires to terminal lugs.
6. Install insulators and clips.

SUBJECT INDEX

SUBJECT	PARA., FIGURE, TABLE NUMBER	PAGE
A		
Ac Input Power	2-6	2-7
Ac Input Power and Battery Standby	2-7	2-8
Adjustment Procedures		5-61
Current Limiting Adjustment	5-40	5-61
Administrative Storage	3-11	3-6
B		
Battery Charging	2-8	2-10
C		
Cable Fabrication		F-1
Capabilities and Features	1-2 b	1-2
Characteristics	1-2 a	1-2
Checking Unpacked Equipment	3-5	3-1
Circuit Descriptions	5-6	5-2
Cleanliness	3-12 a	3-6
Common Tools and Equipment (General Support Maintenance)	5-2	5-1
Common Tools and Equipment (Organizational Maintenance)	3-1	3-1
Components of End Items and Basic Issue Items		C-1
Consolidated Index of Army Publications and Blank Forms	1-2	1-1
Control, Pulse Width Monitor (PWM)	5-6 d	5-2
Controls, Indicators and Connectors	2-2	2-1
Current Limiter	5-6 i	5-4
Cushioning	3-12 b	3-6
D		
Dc Output Connectors and Devices	5-6 k	5-4
Description and Use of Operator's Controls, Indicators and Connectors (General)	2-1	2-1
Destruction of Army Materiel to Prevent Enemy Use	1-4	2-1
Direct Support Maintenance		4-1
Discrepancy in Shipment Report (DISREP)	1-3 c	1-1
E		
Electrical Specifications	1-11	1-3
Environmental Conditions	1-11	1-3
Equipment Characteristics, Capabilities and Features	1-10	1-2

SUBJECT (CONT'D)	PARA., FIGURE, TABLE NUMBER	PAGE
E		
Equipment Data	1-11	1-3
Error Voltage Detect and Sensing Amplifier	5-6 e	5-3
Expendable Supplies and Materials List		E-1
Explanation of Columns (PMCS Checklist)	2-4 d	2-4
F		
G		
General Functional Description	1-13	1-4
General Information	1-1	1-1
General Support Maintenance		5-1
H		
How to Use This Manual		iii
I		
Input Power	5-6 a	5-2
Input Voltage Detector	5-6 b	5-2
J		
K		
L		
List of Abbreviations	1-9	1-2
M		
Maintenance Allocation Chart		B-1
Maintenance Forms, Records and Reports	1-3	1-1
Maintenance Procedures (General Support Maintenance)		5-19
Maintenance Procedures (Organizational Maintenance)		3-4
Marking	3-12 e	3-6
N		
Nomenclature Cross-Reference List	1-6	1-2

SUBJECT (CONT'D)	PARA., FIGURE, TABLE NUMBER	PAGE
O		
Operating Instructions		2-1
Operation In Remote Sensing	2-9	2-12
Operation In Remote Sensing and Battery Standby	1-10	2-13
Operation Under Usual Conditions (General)	2-5	2-7
Operator Preventive Maintenance Checks and Services (General)	2-13	2-4
Organizational Maintenance		3-1
Output Rectifiers and Circuits	5-6 h	5-3
P		
Packing	3-12 d	3-6
Performance Tests		5-47
Output Range Test	5-34	5-47
Regulation Test	5-35	5-49
Over-current Protection Test	5-36	5-53
Ripple Test	5-37	5-55
Power Transfer Test	5-38	5-57
Remote Sensing Test	5-39	5-59
PMCS Procedures	2-4	2-4
Preparation for Storage or Shipment		3-6
Preservation, Packaging, Marking and Shipping Requirements	3-12	3-6
Preventive Maintenance Checks and Services	2-4 c	2-4
Principles of Operation		1-4
Q		
R		
References		A-1
Remote Sensing	5-6 f	5-3
Removal and Replacement Procedures		5-19
Replace Front Panel	5-11	5-20
Replace Top Cover	5-12	5-21
Replace Insulating CAUTION Plate	5-13	5-22
Replace Switcher Board Assembly A1 and Insulating Plate	5-14	5-23
Replace Capacitors C1, C2 and C5 and Resistors R3, R4, R6 and R7	5-15	5-24
Replace Control Board Assembly A3	5-16	5-26
Replace Output Bridge Rectifier Assembly A2 or A4	5-17	5-27
Replace Transformer T1	5-18	5-28
Replace Choke L1	5-19	5-29
Replace High Voltage Rectifier and Filter Assembly A5	5-20	5-30
Replace Transfer Relay K1 and Resistor R9	5-21	5-31
Replace Connectors J3, J4 and J5	5-22	5-32
Replace Fan B1	5-23	5-34

SUBJECT (CONT'D)	PARA., FIGURE, TABLE NUMBER	PAGE
R		
Replace Ac Input Connector J2 (Front Panel)	5-24	5-35
Replace Dc Output Connector J1 (Front Panel)	5-25	5-36
Replace 230 V/115 V Switch S1 or Voltage/Current Switch S2	5-26	5-37
Replace Dc Adjust Potentiometer R2	5-27	5-38
Replace Output Meter M1	5-28	5-39
Replace Dc Circuit Breaker CB2 and Ac Circuit Breaker CB1	5-29	5-40
Replace Ac Indicator DS1, Emer Indicator Lamp DS3 and Norm Indicator Lamp DS2	5-30	5-41
Replace Shunt R1	5-31	5-42
Replace Capacitors C3 and C4 and Resistor R8	5-32	5-43
Replace Capacitors C6, C7 and C8 and Filters FL1, FL4, FL5 and L2	5-33	5-44
Repair Parts (General Support Maintenance)	5-3	5-1
Repair Parts (Organizational Maintenance)	3-3	3-1
Replace Fan Filter	3-12	3-5
Replace Front Cover	3-9	3-4
Report of Packaging and Handling Deficiencies	1-3 b	1-1
Reporting Equipment Improvement Recommendations (EIR)	1-7	1-2
Reports of Maintenance and Unsatisfactory Equipment	1-3 a	1-1
Routine Checks and Services	2-4 b	2-4
S		
Safety, Care and Handling	1-12	1-4
Safety Steps		A
Secondary Functions	5-6 j	5-4
Service Upon Receipt (General)	5-4	5-1
Soft-Start and Transfer Relay Circuit	5-6 c	5-2
Special Tools, TMDE, and Support Equipment (General Support Maintenance)	5-2	5-1
Special Tools, TMDE, and Support Equipment (Organizational Maintenance)	3-2	3-1
Symptom Index (General Support Maintenance)	5-8	5-5
Symptom Index (Organizational Maintenance)	3-7	3-2
T		
Theory of Operation	5-5	5-1
Tools, Materials, and Equipment Needed for Preventive Maintenance	2-4 a	2-4
Troubleshooting, General (General Support Maintenance)	5-7	5-5
Troubleshooting, General (Organizational Maintenance)	3-6	3-2
Troubleshooting Table (General Support Maintenance)	5-9	5-5
Troubleshooting Table (Organizational Maintenance)	3-8	3-2

SUBJECT (CONT'D)	PARA., FIGURE, TABLE NUMBER	PAGE
U		
Unit Drive and Switching Inverter	5-6 g	5-3
Unit Pack Quantity	3-12 c	3-6
Unpacking	3-4	3-1
V		
W		
Warning, General		B
Warranty Information	1-8	1-2
Weight and Dimensions	1-11	1-3
X		
Y		
Z		

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TM 11-5840-340-12

PUBLICATION DATE

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PUBLICATION TITLE

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GRAPHFIGURE
NOTABLE
NO

2-25

2-28

3-10

3-3

3-1

5-6

5-8

F03

IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

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SSG I. M. DeSpirito 999-1776

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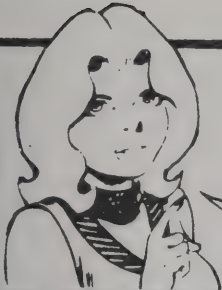
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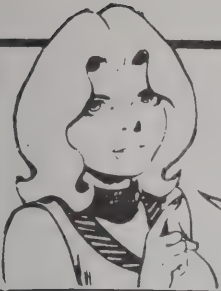


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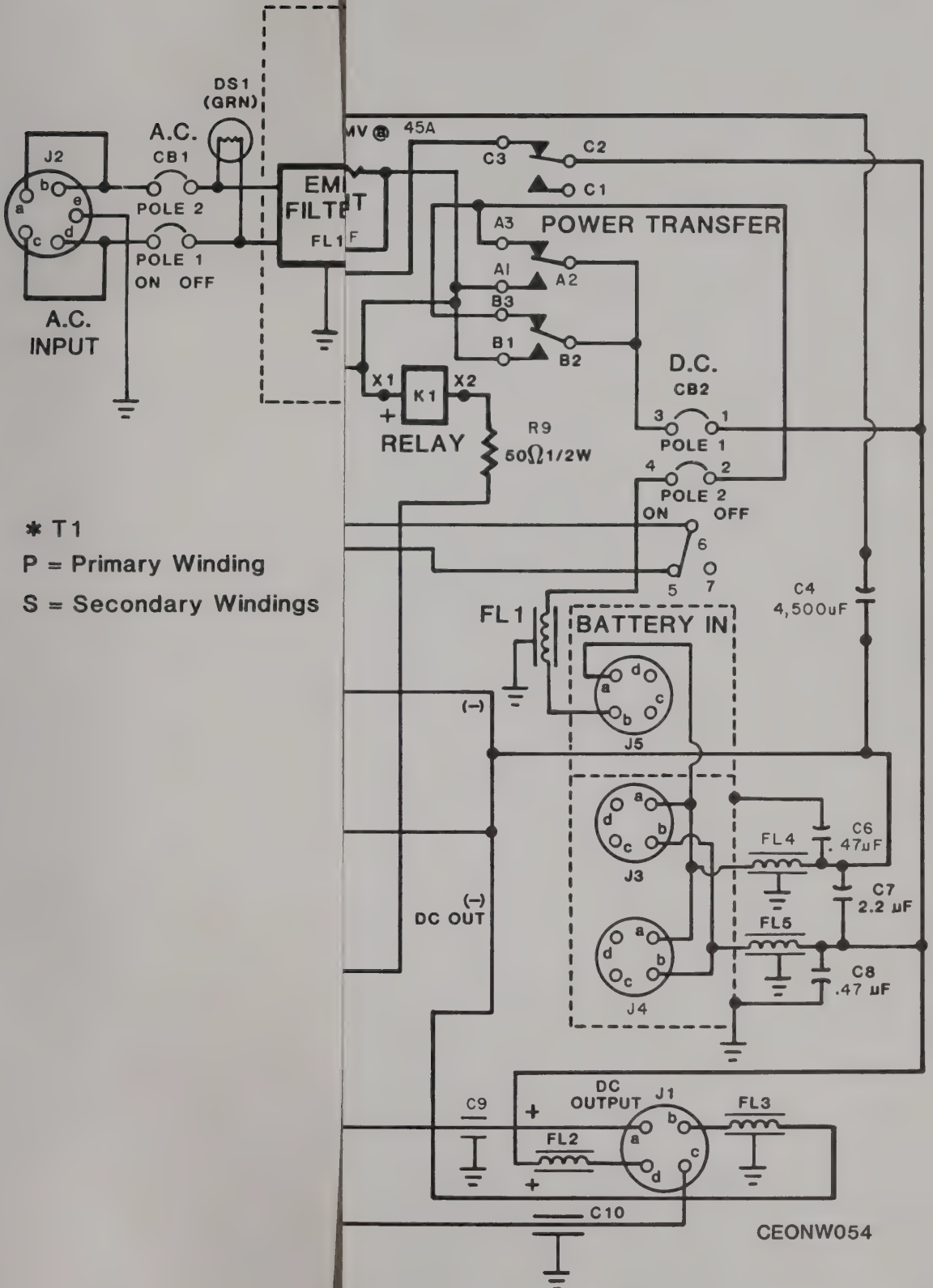
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* T1

P = Primary Winding

S = Secondary Windings

FO-1. PP-6224B/U Schematic Diagram

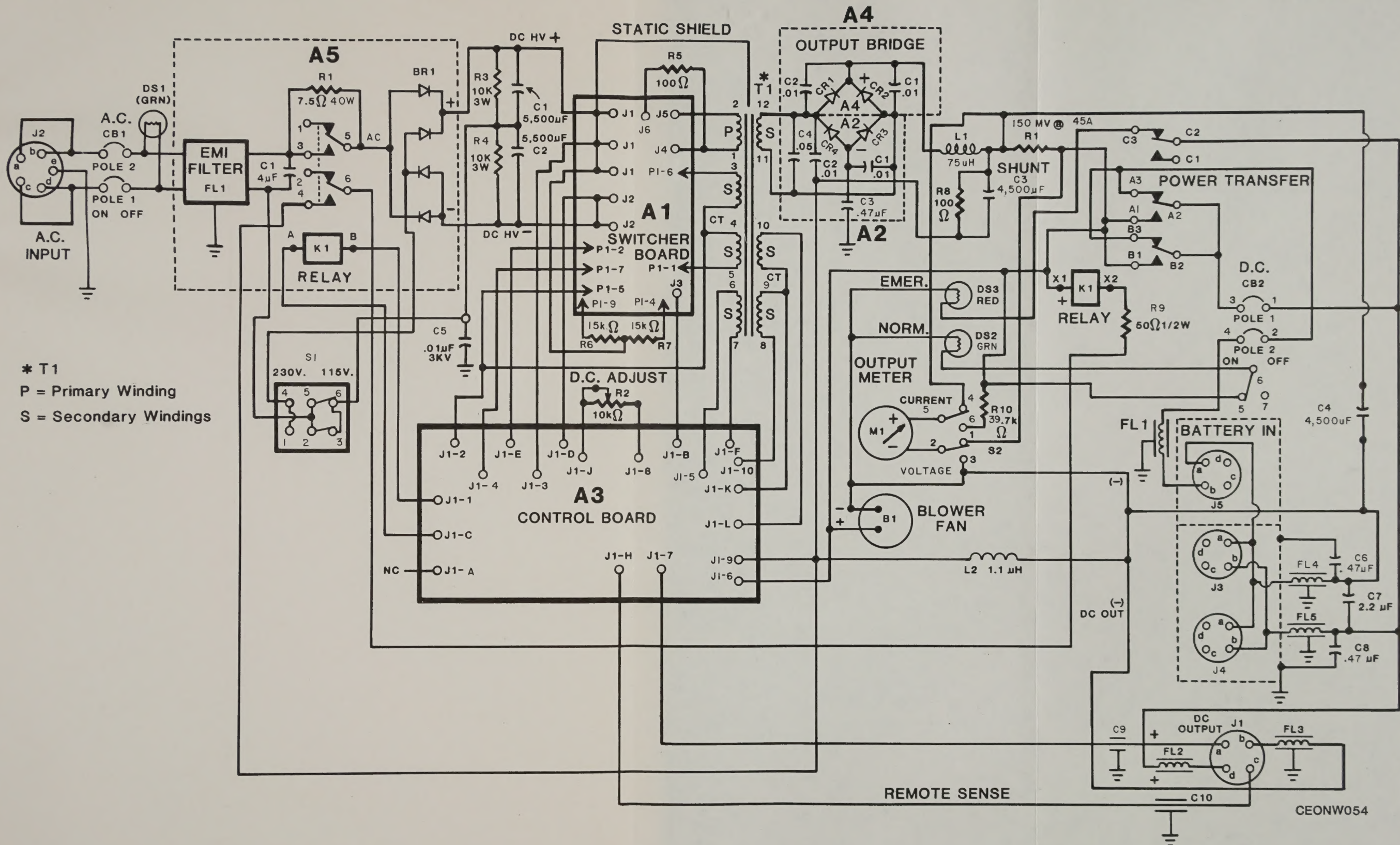


Figure FO-1. PP-6224B/U Schematic Diagram

